SAND2017-2641R

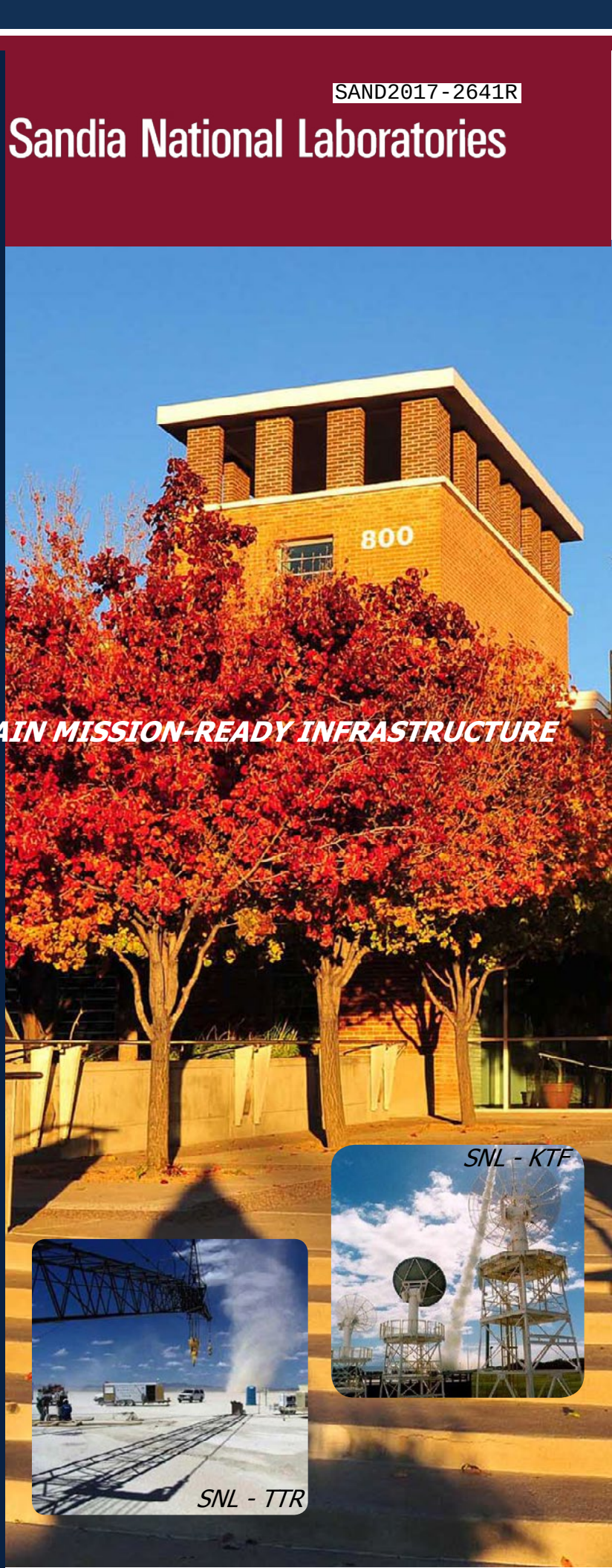
Sandia National Laboratories

INTEGRATED FACILITIES & INFRASTRUCTURE PLAN

PLAN, DELIVER, AND SUSTAIN MISSION-READY INFRASTRUCTURE

SNL – Livermore, California

SNL – Albuquerque, New Mexico



SNL - KTF

SNL - TTR

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Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Message from the President

As we strive to showcase Sandia's diverse missions, career opportunities, encourage collaboration, and above all, highlight our dedication to national service and world-class engineering and service solutions, we must have facilities and tools to support and foster that vision.

President and Laboratories Director Jill Hruby provides a tour of SNL California's unique facilities and capabilities to U.S. Deputy Secretary of Energy Liz Sherwood-Randall.

Sandia sustains an aging infrastructure at multiple sites consisting of more than 1,000 structures occupying more than 7 million square feet. The average age of all our facilities is 38 years, many dating to the late 1940s.

The purpose of this Integrated Facilities & Infrastructure Plan is to advance the management, stewardship, improvement, and acquisition of facilities and infrastructure, as well as ensure limited resources are appropriately applied.

In this document, you will read about the overarching facilities and infrastructure strategy, the long-range site development framework, and the facilities and infrastructure investment plan.

These documents outline the priorities, goals, and principles by which we manage our current site and make investment decisions. It is an effective tool used to define and share our long-range vision for the laboratories, and to budget and prioritize immediate and short-term capital actions.

I believe the strategic execution of a thoughtful and comprehensive facilities and infrastructure plan for Sandia is one of the defining issues of our time. Stewardship of our unique facilities must enhance our capabilities and create an environment that aligns with our mission needs and attracts, motivates, and retains our extremely talented people.

If we are to continue to push the frontiers of science and technology, let us commit to a facilities and infrastructure renewal that supports our long-term direction and strategy.

Jill Hruby
President and Laboratories Director
Sandia National Laboratories

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Introduction and Background

Our facilities and infrastructure are a key element of our capability-based science and engineering foundation. The focus of the Integrated Facilities and Infrastructure Plan is the development and implementation of a comprehensive plan to sustain the capabilities necessary to meet national research, design, and fabrication needs for Sandia National Laboratories' (Sandia's) comprehensive national security missions both now and into the future. A number of Sandia's facilities have reached the end of their useful lives and many others are not suitable for today's mission needs. Due to the continued aging and surge in utilization of Sandia's facilities, deferred maintenance has continued to increase. As part of our planning focus, Sandia is committed to halting the growth of deferred maintenance across its sites through demolition, replacement, and dedicated funding to reduce the backlog of maintenance needs. Sandia will become more agile in adapting existing space and changing how space is utilized in response to the changing requirements.

This Integrated Facilities & Infrastructure (F&I) Plan supports the Sandia Strategic Plan's strategic objectives, specifically Strategic Objective 2: Strengthen our Laboratories' foundation to maximize mission impact, and Strategic Objective 3: Advance an exceptional work environment that enables and inspires our people in service to our nation. The Integrated F&I Plan is developed through a planning process model to understand the F&I needs, analyze solution options, plan the actions and funding, and then execute projects.

The three primary components of the Integrated F&I Plan are described as follows.

- The Facilities & Infrastructure (F&I) Strategy, which conveys the F&I Vision and Mission and sets forth high level strategic priorities that provide us with a roadmap for moving toward a framework for how the site should develop physically (the Long-Range Development Framework), and to guide investments (the Five Year F&I Investment Plan).

- The Long-Range Development Framework (LRDF) articulates a long-range development vision, framework goals, and a set of integrated development principles for land use, security, transportation, and environmental sustainability. The LRDF is not a project planning document. It introduces planning concepts and provides guidance regarding effective, efficient, and sustainable site development that will advance the overall F&I vision.

Sandia Strategic Objectives

1. Amplify our national security impact.
2. Strengthen our Laboratories' foundation to maximize mission impact.
3. Advance an exceptional work environment that enables and inspires our people in service to our nation.

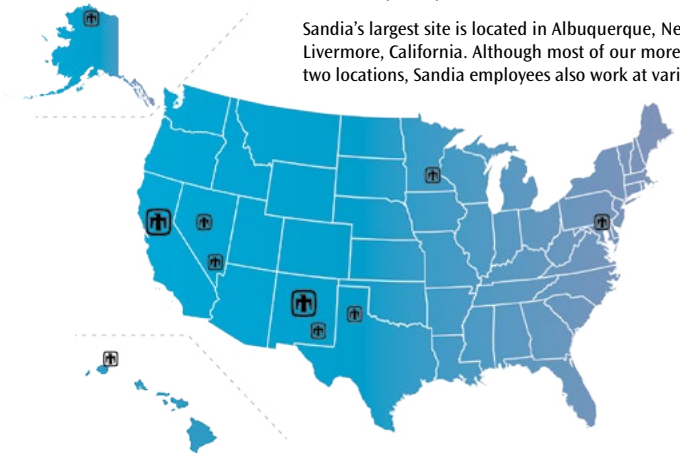
SNL, California

SNL, New Mexico

Tonopah Test Range, Nevada

Kauai Test Facility, Hawaii

- The Facilities & Infrastructure (F&I) Investment Plan communicates the synthesis of the Strategy through prioritized F&I investments that implement the planning concepts contained in the F&I Strategy and the LRDF at a project level of development.



Locations

Sandia operates laboratories, testing facilities, and offices at several sites in the United States and participates in research collaborations around the world.

Sandia's largest site is located in Albuquerque, New Mexico. Our second principal site is in Livermore, California. Although most of our more than 10,000 employees work at these two locations, Sandia employees also work at various other locations listed below.

Principal Sites

Albuquerque, New Mexico
Livermore, California

Mission-Specific Locations

Tonopah Test Range, Tonopah, Nevada
Kauai Test Facility, Waimea, Hawaii
Carlsbad Programs Office, Carlsbad, New Mexico
Nevada Projects Team, Mercury, Nevada
Weapons Evaluation Test Laboratory, Amarillo, Texas
Sandia Washington Office, Washington D.C.
Atmospheric Radiation Measurement Facility, Barrow, Alaska
Computing Research Facility, Shoreview, Minnesota

Three Primary Components of the Integrated Facilities and Infrastructure Plan:

- Facilities & Infrastructure Strategy
- Long-Range Development Framework
- Facilities & Infrastructure Investment Plan

Sandia's Asset Portfolio

Sandia's real property asset portfolio supports mission work at four primary sites in New Mexico (SNL/NM), California (SNL/CA), Nevada, & Hawaii. Sandia also, through real estate transactions, has operations at other locations, such as Alaska, Washington DC, and Texas.

Table 1. Operations and Maintenance Service

Sandia Facility Location	# of Buildings	# of Trailers	# of Other Structures	Acres	Gross Square Feet
Albuquerque, NM	558	142	62	13,740	5,902,841
Livermore, CA	66	11	36	410	880,839
TTR, NV	79	3	58	179,200	121,939
KTF & Maui, HI	29	27	50	133	50,317
Leases	14	2	1	19	364,691
Permits	98	0	3	0	216,034
Sandia Total	844	185	210	193,502	7,536,661

Source: FIMS FY15 Year-end Snapshot

Vision for Sandia's Sites

Sandia's long-range site development vision is to conduct Sandia's critical national security work with **"exceptional facilities and infrastructure that underscore our diverse missions, steward mission capabilities, inspire our workforce, and demonstrate our dedication to national service and world-class engineering and science."**

This vision informs our Mission Statement: plan, deliver, and sustain a mission-ready infrastructure.

Strategic Priorities

This vision will be achieved through the following strategic priorities:

1. Enhance mission capabilities
   - 1.1 Steward unique facilities and their capabilities
   - 1.2 Ensure general infrastructure reliability
   - 1.3 Be agile and flexible to change
   - 1.4 Perform acquisition, operations, maintenance, and modifications in a cost-effective manner

2. Provide attractive, state-of-the-art, leading edge work environment
   - 2.1 Enhance quality of the work environment for recruitment, retention, and motivation of staff
   - 2.2 Provide flexible, agile, and updated work spaces

3. Provide F&I that facilitate collaboration and tech transfer
   - 3.1 Support initiatives such as Livermore Valley Open Campus, Center for Collaboration and Commercialization, and use of academic or industrial institutions
   - 3.2 Optimize long-term use of land and capital

These strategic priorities provide direction to inform the implementation plans in support of the Sandia entities that execute, or support the execution of, Sandia's mission. They highlight key areas for increased leadership attention and investment focus with the expectation that this focus will help us to achieve our vision. This Integrated Facilities & Infrastructure (F&I) Plan does not intend to capture the totality of the F&I work at the Labs. Its purpose is to give long term direction and strategy for the Laboratories so that the sum of the improvements over time will have a greater strategic impact than the individual projects taken separately.

Programmatic and Institutional Facilities and Infrastructure Drivers

The Lab's vision: "On behalf of our nation, we anticipate and solve the most challenging problems that threaten security in the 21st century." Sandia's highest ambition remains "to be the laboratory that the U.S. turns to first for innovative, science-based, systems-engineering solutions to the most challenging problems" that face the nation and the globe. Given the broad nature of assignments, Sandia will have to balance the size and scope of its F&I portfolio to support future scientific and engineering endeavors, both simulated and physical in nature.

Sandia National Laboratories FY16 - FY20 Strategic Plan

Sandia's mission commitments are outlined in the FY16 - FY20 Sandia National Laboratories Strategic Plan. The Strategic Plan fully lays out the conceptual framework of the Labs' missions which includes nuclear weapons at its base and has a symbiotic relationship with three other mission areas including: global nuclear assurance and security, cyber space, and US defense technology. Developing national security space innovations, reducing global biological and chemical dangers, and ensuring a secure and sustainable energy future are connected to nuclear weapons through the Labs' foundation (for a detailed description, see the FY16 - FY20 Sandia National Laboratories Strategic Plan).

To best carry out these nuclear and national security missions, Sandia research and development environments have to be designed to accommodate physical, virtual, and simulation spaces, as well as sophisticated laboratory and test facilities. Proper F&I enable the success of the Lab's endeavors.

Sandia National Laboratories Division F&I Plans & Capabilities

In addition to sustaining aging facilities and infrastructure, Sandia must constantly look at ways to improve flexibility and agility to support Sandia's changing missions and budget situation, configure space around the nature and type of mission support work, and create a physical infrastructure as a component of attracting and retaining a superior workforce. Strategic planning for F&I responsive to long-term mission requirements enables a science and technology base necessary for long-term national security.

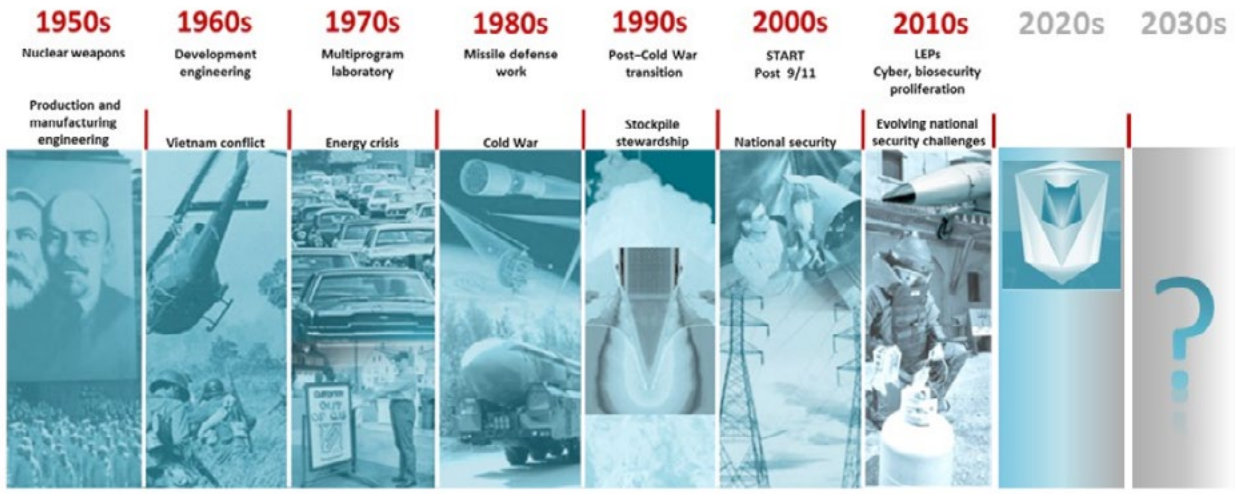
The annual completion of Division F&I plans provide valuable information and insight with respect to the current state of facilities and infrastructure and future states required to support current and anticipated missions.

In FY16 Sandia evaluated the state of capabilities by looking at its mission drivers and the potentional gaps and risks to success within the facilities and infrastructure. This proccess yielded numerous current needs and future planning drivers that will require a broad range of investments (both indirect and direct funds) in building, infrastructure, and mission sustainment and modernization as well as site reconfiguration, space optimization, and work environment.

Conclusion

Sandia has a long successful history, and the graphic below describes how Sandia's work has adjusted to address the nation's greatest concerns of national security impact.

This document explores the challenges of the future that the nation will look to Sandia to solve. By considering ahead of time the facilities and infrastructure required to do Sandia's future work, the planning and site modifications can be more responsive and agile and will better enable Sandia to continue to excel in our diverse mission work.



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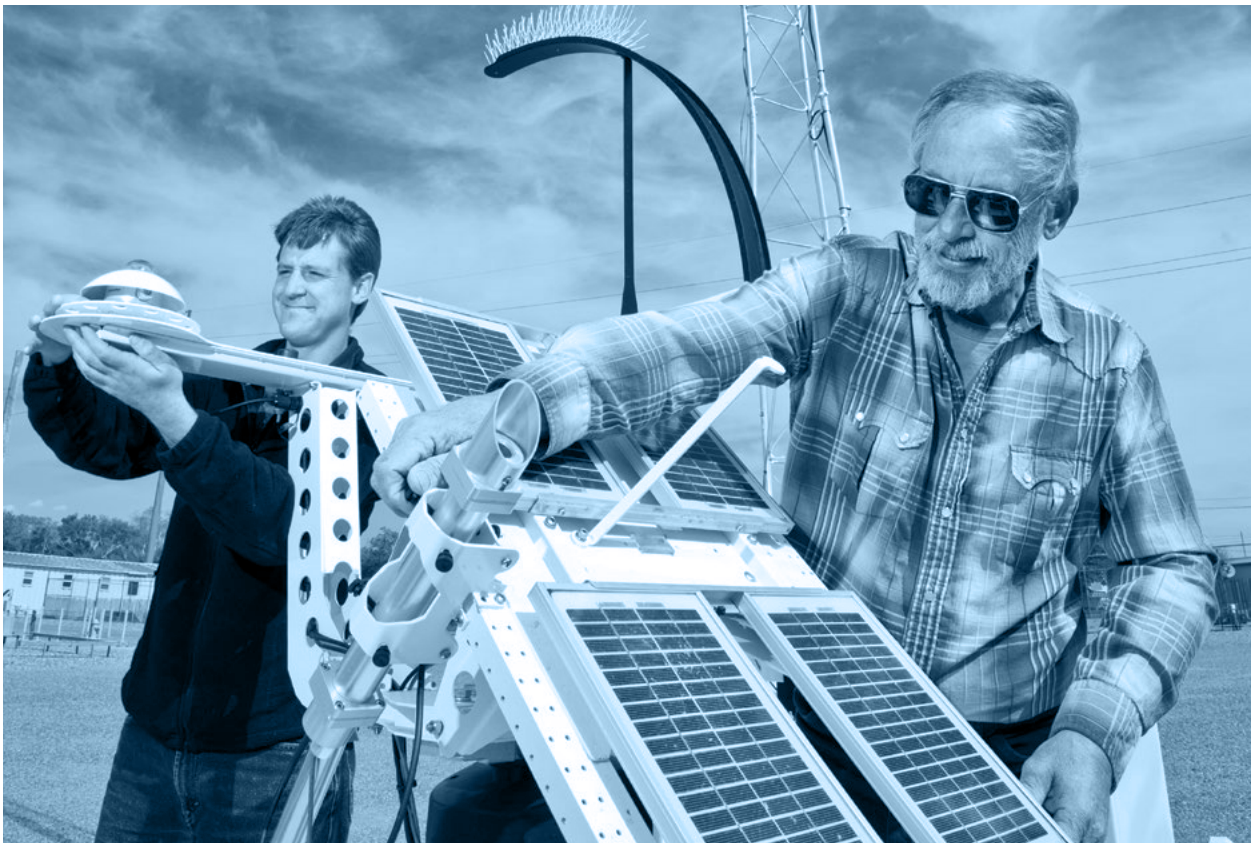

Plan Endorsement

March 21, 2016

Michael W. Hazen — Date

Vice-President, Infrastructure Operations

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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Message from the Vice President, Infrastructure Operations

The Long-Range Development Framework (LRDF) updates the 2006 Sandia Long-Range Development Plan. To guide effective, efficient, and sustainable land and infrastructure development for Sandia's sites, the LRDF identifies a long-range development vision, framework goals, and a set of integrated planning principles for land use, security, transportation, and environmental sustainability.

The LRDF is neither a project planning document, nor does it recommend or eliminate specific projects; rather, it introduces planning concepts and provides guidance regarding effective, efficient, and sustainable site development. Companion Sub-Area Plans provide greater detail about the long-range (20+ years) development vision and capital investment requirements, and opportunities to improve efficiency and enhance specific areas of the sites.

In addition to identifying the best areas and locations for future development and redevelopment, the LRDF supports decision-making associated with Sandia's Five-Year Facilities and Infrastructure Investment Plan. Embodied in the LRDF is recognition that in the future, smaller and more affordable development footprints will be a necessity along with redevelopment of previously used sites. For efficiency and collaboration purposes, sites will be organized around common mission work and the NM and CA sites will require some redesign to foster improved external collaborations and partnerships.

Considered together, the LRDF and the Sub-Area Plans provide an integrated vision for development that enables Sandia to shape the design of projects in ways that benefit sponsors, the workforce, the company, the nation, and the environment for a positive long-term impact.

Michael W. Hazen

Vice President, Infrastructure Operations

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Photographs derived from SNL sources unless otherwise noted.

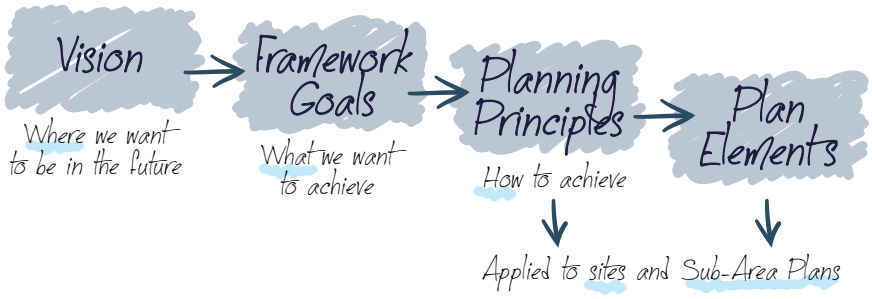
Introduction and Purpose

The Long-Range Development Framework (LRDF) guides effective, efficient, and sustainable land and infrastructure development for Sandia National Laboratories' (SNL) New Mexico and California campuses.

The LRDF is Sandia's seminal site planning document. Similar to a municipal planning document, it articulates a long-range development vision, framework goals, and a set of integrated development principles for land use, security, transportation, and environmental sustainability. The LRDF is neither a project planning document, nor does it recommend or eliminate specific projects; rather, it introduces planning concepts and provides guidance regarding effective, efficient, and sustainable site development.

The LRDF provides the overall framework to guide effective, efficient, and sustainable land and infrastructure development for the New Mexico and California Campuses.

Companion Sub-Area Plans provide greater detail about the long-range (20+ years) development vision and capital investment requirements, and opportunities for specific campus areas.



Considered together, the LRDF and the Sub-Area Plans provide an integrated vision for development that enables Sandia to shape the design of projects in ways that benefit sponsors, the work force, the company, the nation, and the environment for a positive long-term impact.

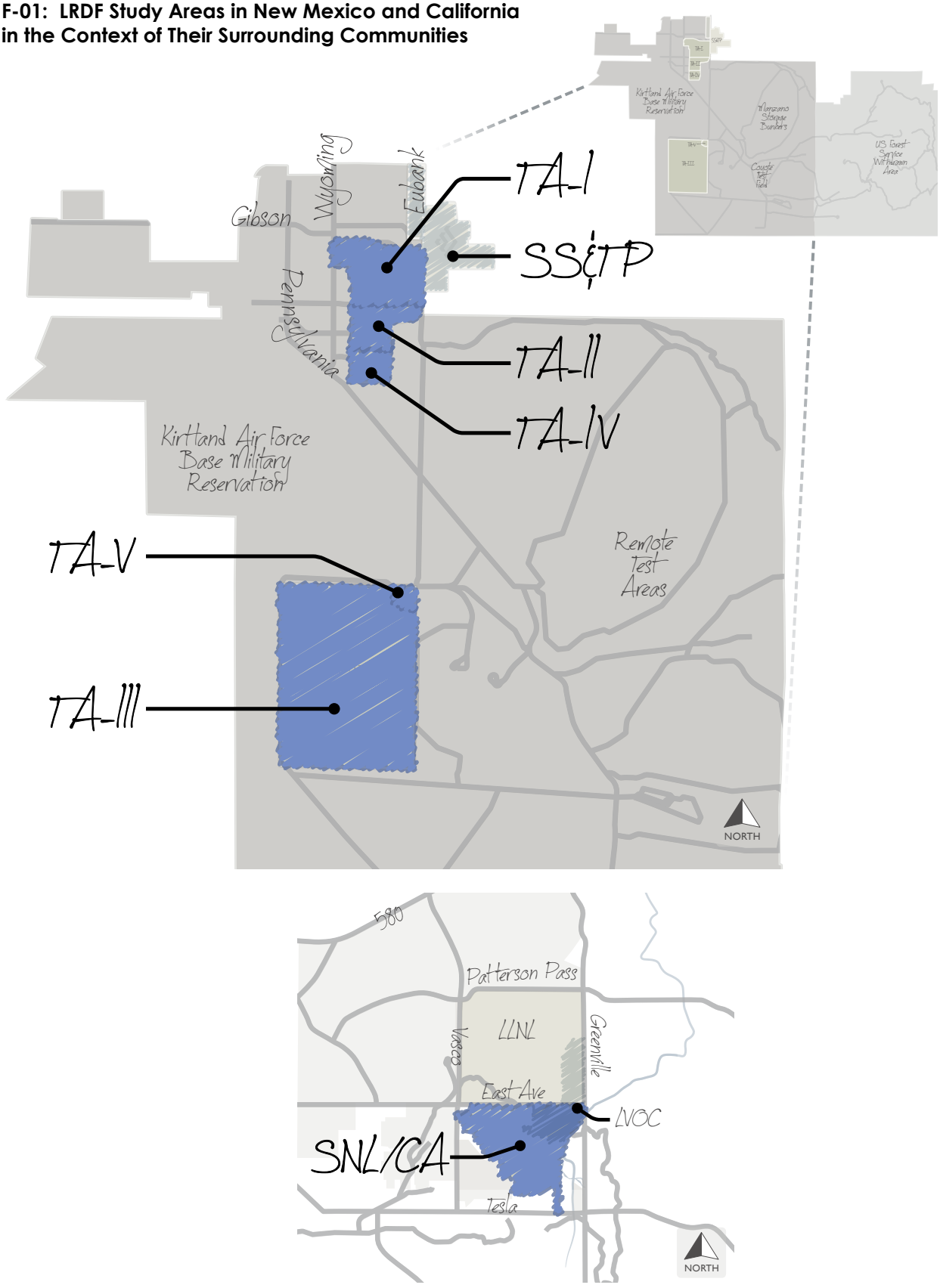
Long-term implementation of the Plans will minimize risk associated with:

- Facilities and infrastructure required to sustain and enhance mission work
- Security
- Safety
- Operations and maintenance costs
- Recruitment and retention

Sandia finds itself at the threshold of major change, which will require substantial capital investments to improve and modernize existing structures, construct new facilities, and maintain/enhance security and safety for evolving and changing missions. Sandia's biggest challenge is to meet its multi-mission national security responsibilities while relying on a single source of funding for facilities and infrastructure capitalization.

A challenging funding environment presents Sandia with a unique opportunity to leverage alternative and non-traditional funding sources to renew its New Mexico and California campuses, and provide the space and infrastructure required to maintain Sandia's standard of excellence. This document presents areas of opportunity to employ efficient land use and infrastructure planning to minimize capital investment.

F-01: LRDF Study Areas in New Mexico and California in the Context of Their Surrounding Communities



Planning Overview

Sandia's ability to provide required facilities, infrastructure, and support services at both of its primary campuses directly impacts its potential to achieve its mission goals.

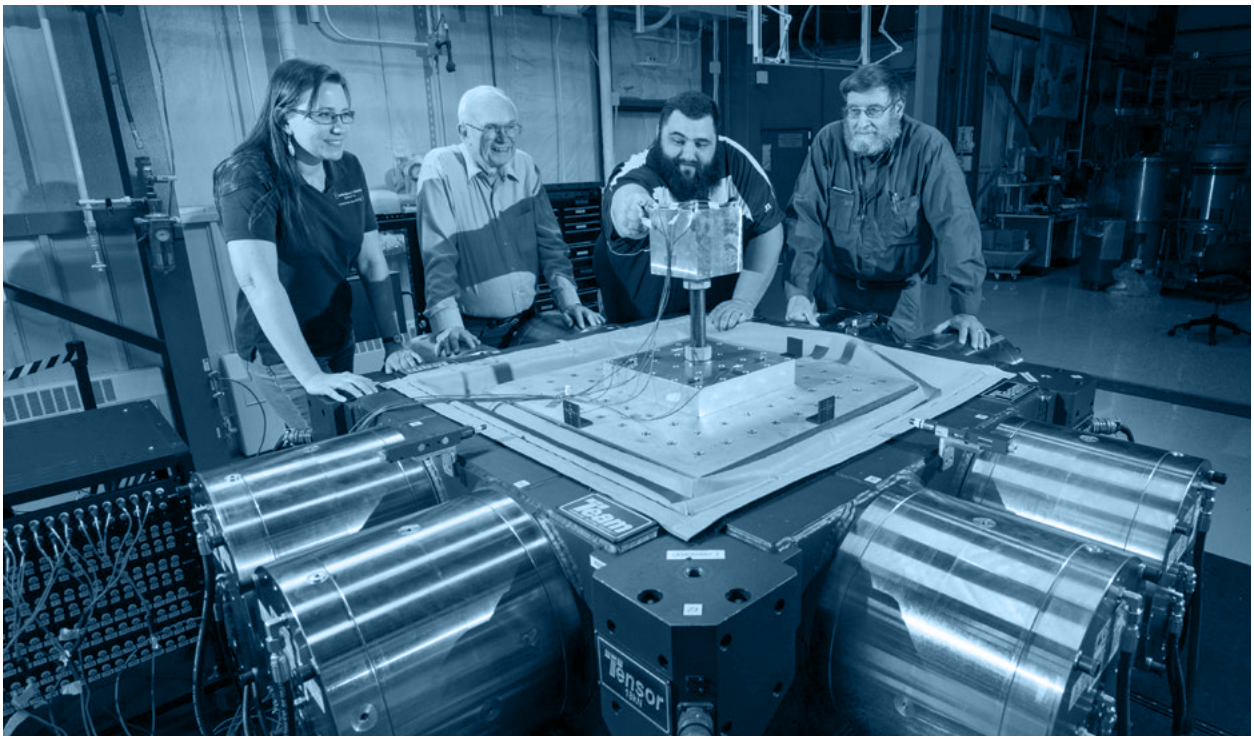
Three major forces have historically influenced Sandia's development: primary mission functions at the time the development was occurring, the nature and level of funding for capital projects, and the availability of large tracts of developable land. Much of the existing development is the result of unplanned growth, characterized principally by low density, low profile structures — mirroring the development patterns of the surrounding Albuquerque and Livermore communities. The LRDF seeks to reverse and mitigate these trends over time.

Sandia's development approach emphasizes asset management, planned growth, and sustainability to effectively provide for future facility and infrastructure needs.

Today, Sandia faces a different development environment. Factors that challenge Sandia's ability to plan for the future include: a changing geopolitical environment that impacts mission needs; the amount of land and nature of development on the campuses; increased environmental responsibilities; need for energy reduction and increased sustainability; and capital funding constraints. Trends in technology, demographics, and security requirements pose additional complexities.

These factors, in combination with circumstances where vacant developable sites are at a premium, emphasize the need to make best use of existing land assets, emphasizing compact development, redevelopment, and infill. This situation mirrors the evolution of many western cities and college campuses from low to higher density development.

As growth and site constraints result in attributes more analogous to an urban campus, Sandia needs a development approach with greater emphasis on asset management, density, and sustainability to effectively provide for future facility and infrastructure needs.



Vision & Strategic Priorities

The Strategy section of the Integrated Facilities & Infrastructure Strategic Plan contains the vision and strategic priorities for Sandia's sites. The Development Framework goals listed below explain the purpose behind the framework for site development.

Development Framework Goals

The LRDF endeavors to create a national security laboratory that preserves the enormous investment in the current campuses while transforming them to meet the needs of new and expanding missions in a sustainable, cost-effective manner.

The LRDF seeks to:

- Optimize the long-term use of land and capital
- Promote innovative, agile, and flexible facilities and infrastructure to support changing missions
- Maximize efficiency and effectiveness, and minimize long-term operations and maintenance (O&M) costs utilizing life-cycle asset management as a major tool
- Maintain and enhance physical security at the campuses, mindful of evolving client bases
- Maintain and enhance a safe and sustainable campus
- Maintain and enhance on-site and off-site mobility
- Enhance the quality of the environment and quality of life for those employed at Sandia
- Promote attractive, pedestrian-oriented environments
- Promote internal and external interaction and collaboration
- Reinforce a consistent image and identity conveying Sandia's strength in world-class engineering and science solutions

Center for Integrated Nanotechnologies (CINT) in Albuquerque, New Mexico.

Planning Principles

The following planning principles guide the planning, design, and location of facilities and infrastructure investments to achieve the vision.

Gateways and Approaches

Create gateways, approaches and wayfinding elements that distinguish Sandia from Kirtland Air Force Base (KAFB) at the New Mexico Site, and provide clear and convenient access for visitors and staff at both sites.

Site Organization

Promote collaboration and efficiency by clustering work activities and programs, capitalizing on functional connections and synergies between common tools, workforce, and facilities.

Security and Safety

Maintain a hierarchy of security levels, and provide an environment that balances diverse and changing needs for both secure and open work environments. Promote architectural surety in building and site design.

Land Use and Development

Support and maximize development of adjacent, compatible, and functionally-related land uses, and coordinate development of land with comprehensive planning and installation of infrastructure.

Site Utilization

Make the best use of valuable real estate by promoting compact development, redevelopment, and infill, while minimizing inefficient use of land (e.g., small-scale development, surface parking).

Facility Siting

Site new facilities in locations based upon the function and nature of work, and the specific facilities, infrastructure, and human resources required to best support the primary function or capability.

Overall Growth

Identify and pursue growth opportunities within existing Technical Areas where land is available, or where redevelopment enhances functionality, efficiency, and/or sustainability.

Internal Circulation and Interaction

Reinforce the prominence of internal destinations, improve connectivity between destinations, enhance safety, and maximize opportunities for synergistic interaction between people and programs.

External Outreach and Collaboration

Open the sites to interface and collaborate with external organizations, foster next-generation educational and research partnerships, and strengthen corporate identity.

Sustainability

Ensure the optimization of Sandia's assets by integrating principles of sustainability and environmental management in planning and design considerations.

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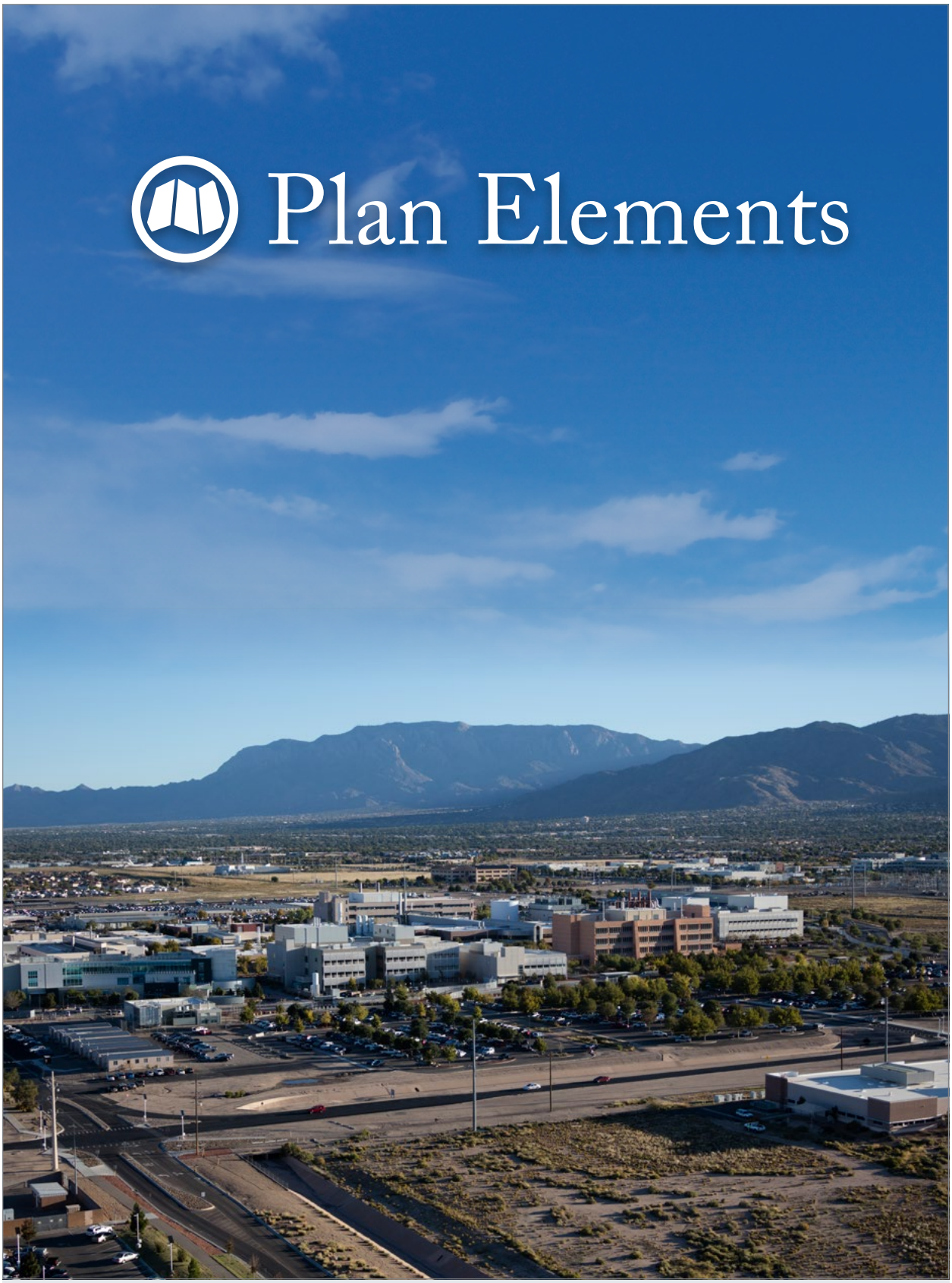
Plan Elements



2012 aerial image of Sandia Science & Technology Park (SSTP), located in Albuquerque, New Mexico

Future Land Use

Future overall land use at Sandia's sites will remain much as it is today — a mixture of uses reflecting Sandia's R&D and testing mission responsibilities.

Future overall land use at Sandia's primary sites will remain much as it is today.

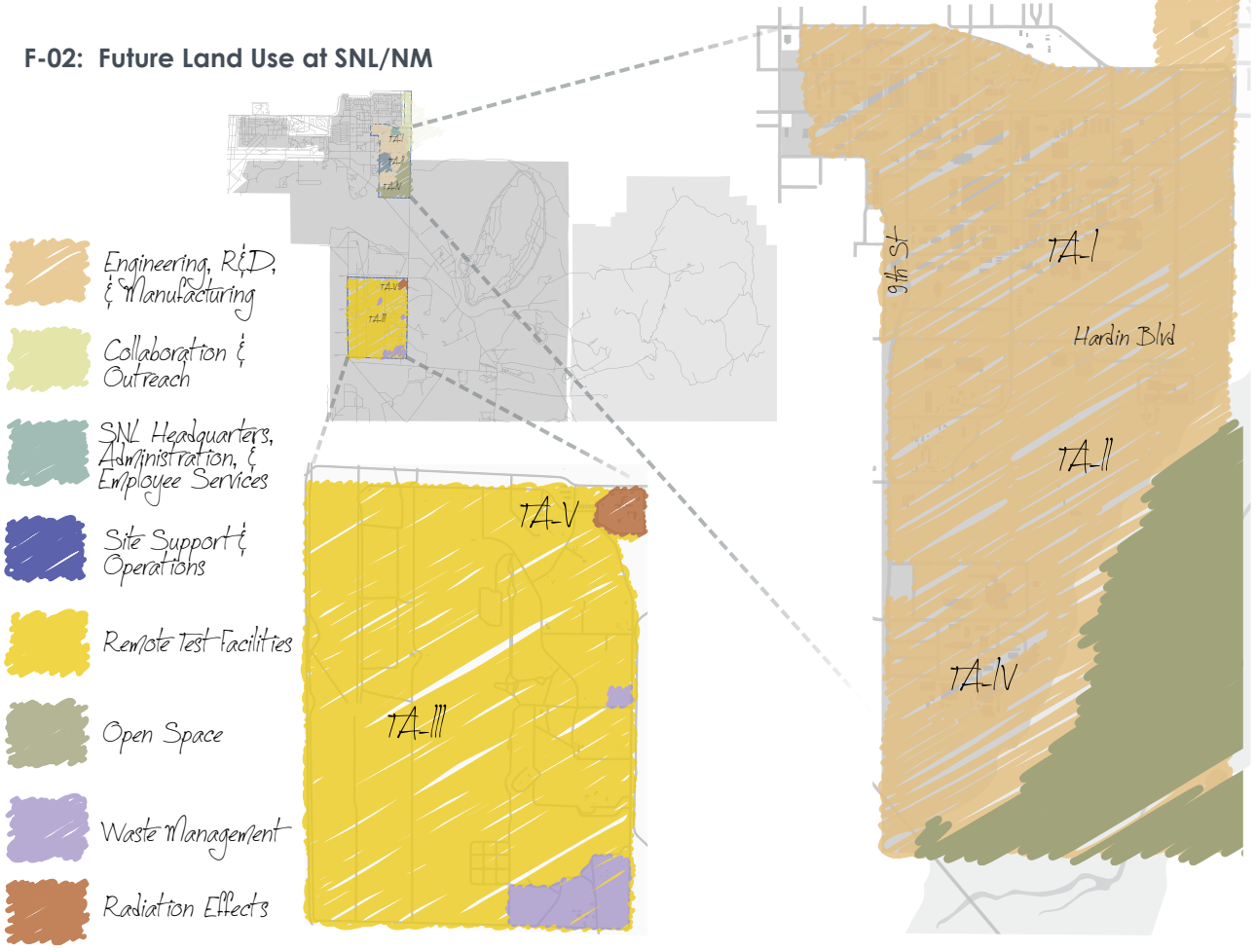
LRDF land use recommendations incorporate extensive study of Sandia property as well as examination of long-range plans for entities surrounding each site. The LRDF encourages future development within the smallest footprint feasible, which decreases infrastructure expenses, promotes human interaction, and serves sustainability interests.

New Mexico Site

At SNL/NM, planning analysis shows considerable redevelopment opportunities within TA-I and TA-IV for research and office uses. Also, a large potential for development is within TA-II, south of Hardin Boulevard, primarily for mission support services. Future land use accommodates an expanded collaboration and outreach zone on the Eubank corridor with an adjacent centralized zone anticipating consolidating mission headquarters, administration, and employee services.

The LRDF development strategy for SNL/NM expansion preserves large tracts of land, primarily in TA-III, for future mission use related to testing; buffers required for research and testing; and protects large tracts for open space. The land use vision for the Remote Areas and Coyote Test Field is to protect current uses.

F-02: Future Land Use at SNL/NM



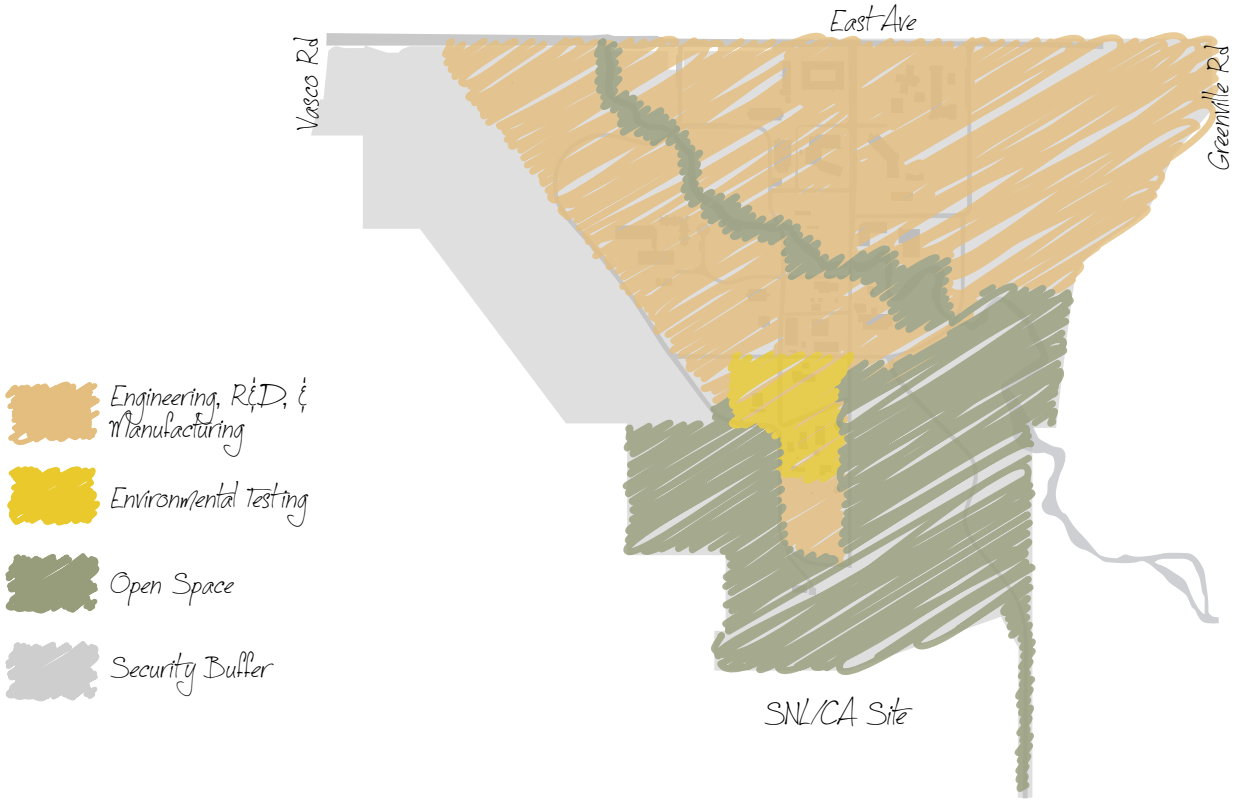
California Site

The SNL/CA site is currently a mixture of undeveloped land surrounding a campus-like collection of offices, laboratories, and support buildings.

The SNL/CA site is no longer as remote as it was when first established. Residential properties on the west of the site increasingly abut the site's security buffer zone, and it is likely that the City of Livermore will ultimately promote development to the north of the site, eliminating the agricultural buffer on that side of the property. In this environment of gradual urbanization around the site, maintaining the integrity of the security buffers becomes increasingly challenging.

Future land will largely reflect current site uses. An expanded Collaboration and Outreach zone on the east portion of the site will support the long-range development of the Livermore Valley Open Campus (LVOC). Open space will be preserved and enhanced for recreation and wildlife habitat protection.

F-03: Future Land Use at SNL/CA



Site Organization & Location Analysis

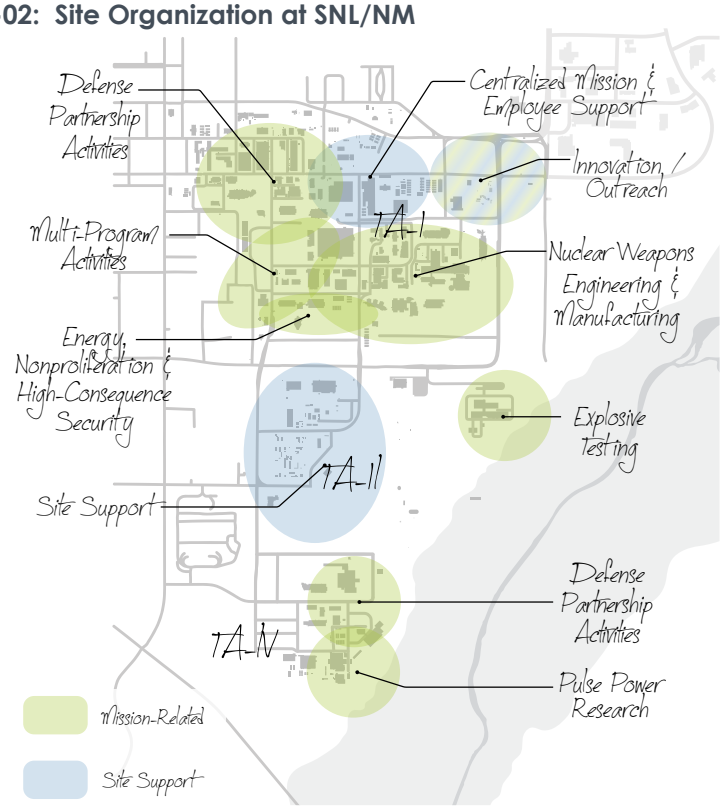
The long-range site organization vision for each site builds upon multiple LRDF planning principles including site organization, security and safety, gateways and approaches, internal circulation and interaction, and external outreach and collaboration.

Cluster programs and capabilities to promote collaboration and efficiencies, and capitalize on functional connections and synergies.

Each site seeks to:

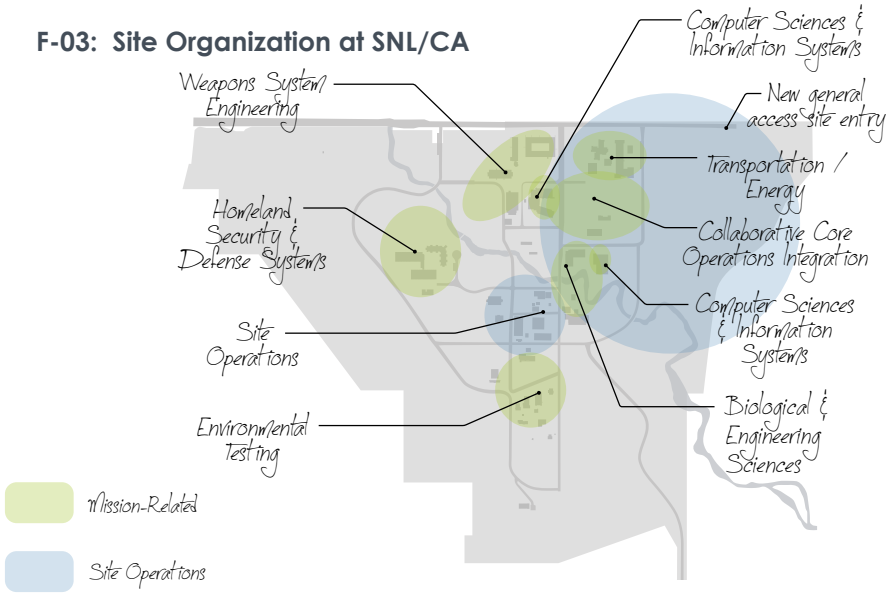
- Create and reinforce a clear "front-door" that presents a strong Sandia "brand," and is easily accessible to visitors and Sandia staff
- Expand the general access area to enhance external outreach and collaboration opportunities
- Cluster programs and capabilities in "village" zones to promote collaboration and efficiencies, and capitalize on functional connections and synergies
- Centralize common support activities and functions

F-02: Site Organization at SNL/NM



Sandia has a two tiered approach to siting buildings. At a conceptual level Sandia utilizes a Location Analysis, which considers factors such as site organization, availability of utilities, and transportation access. For larger projects with more site impact, Sandia makes use of a Site Investigation Procedure which examines the sites more thoroughly.

F-03: Site Organization at SNL/CA



Positioning the Sites for Business Success

The LRDF supports campus design that maintains levels of security required for the National Security Enterprise, fosters educational and research partnerships, and facilitates collaboration with other world-class scientific enterprises. Facilitating external collaboration impacts LRDF strategies for land use, site organization, vehicular access, and security.

Support campus design that facilitates external collaborations by linking Sandia's world-class facilities with research and technology transfer activities within a flexible and adaptable campus environment, while maintaining required security.

Campus design that accommodates educational and research partnerships should be flexible and adaptable, reflecting cutting-edge site development principles.

Security plans must clearly and consistently define the boundaries for all Sandia space. However, planning needs to recognize the inherent conflict between rigorous "need-to-know" requirements for national security work and the ability to interact with external scientific and engineering communities. Both the New Mexico and California sites struggle to maintain balance and flexibility in addressing varying security requirements. Site development and building design should complement Sandia's security constraints, leading to a security environment that is simple, enduring, and universal, but that does not inhibit domestic and global engagement.

Redesigning a Portion of the New Mexico Site

SNL/NM resides within an Air Force Base boundary, which presents unique challenges to site access, physical security, and working relationships with the external scientific and research community. As a result, the ability to collaborate with external partners is more difficult than at other national laboratory sites. Examination of Sandia has identified concepts that can remedy this long-standing access limitation, and help attract a highly skilled next-generation workforce. The primary drivers behind the concepts examined include:

- Potential site security/access changes that a Defense Base Closure and Realignment Commission (BRAC) situation at KAFB would require
- Creating a stronger corporate identity distinct from KAFB
- Overall access and circulation improvements
- The need for recapitalization of old buildings housing administrative and employee support functions
- The need to support outreach and collaboration
- Enabling greater community integration

F-04: Conceptual Rendering for Center for Collaboration and Commercialization (C3)

Located in the Sandia Science & Technology Park (SS&TP), the proposed multi-tenant facility would be dedicated to increasing technology transfer, collaboration and commercialization activities.

Concepts to redevelop the northeast quadrant of TA-I and the Eubank Gateway have been studied under the labels of "Innovation Corridor," "National Security Campus," "Mission Support Complex," "Mission Integration Complex" and "Campus Commons." All of the concepts seek to link Sandia's world-class facilities & people within the Albuquerque campus' boundaries with external research and technology transfer activities.

F-05: Site/Campus Design for Long-Term Business Success

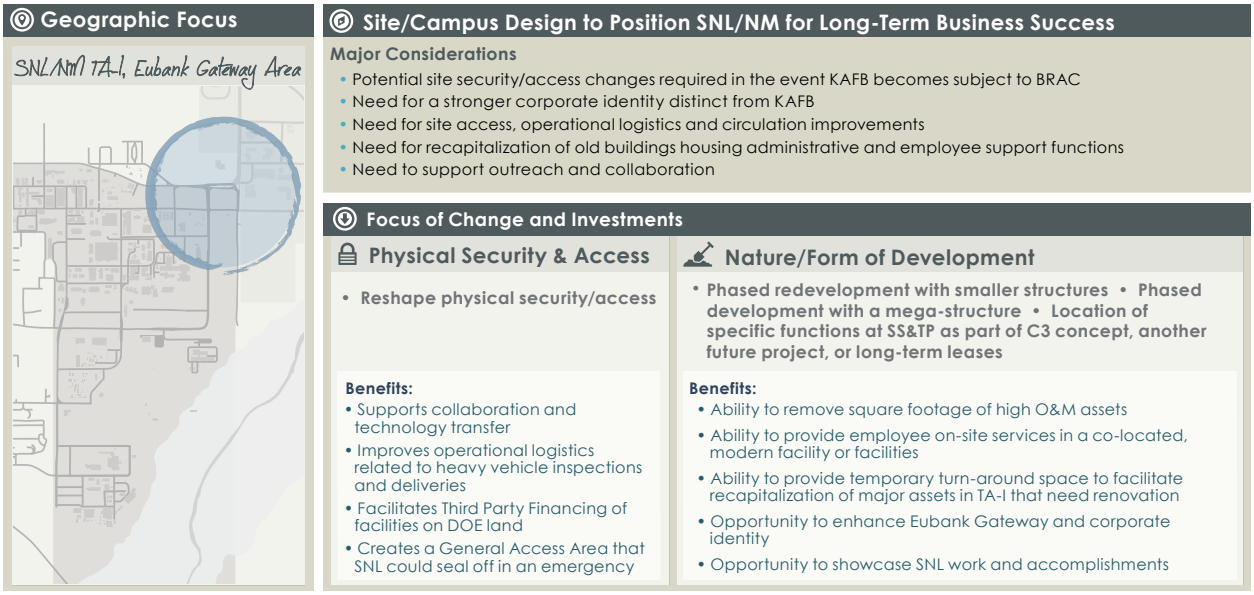


Figure F-05 summarizes how changes to physical security and investments in facilities can make the campus more amenable to external collaboration and technology transfer. Following a corporate commitment, Sandia Executive Management could choose from various concepts, options, and incremental actions to further study and implement.

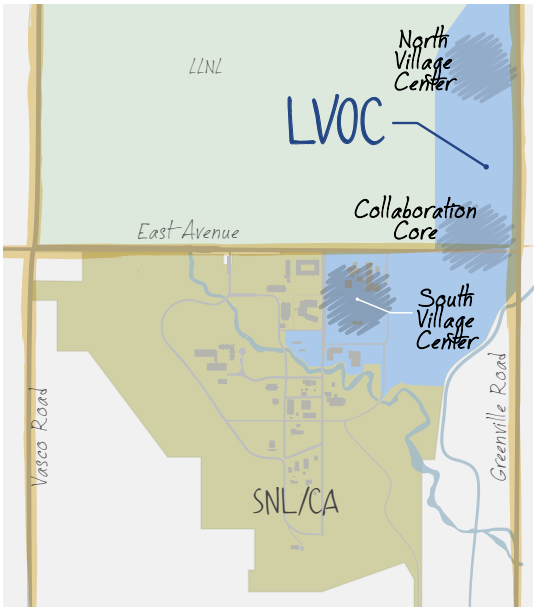
Fostering Innovation and Collaboration for the Livermore Valley Open Campus

SNL/CA and Lawrence Livermore National Laboratory (LLNL) have collaborated to develop a plan for the Livermore Valley Open Campus (LVOC), now in early stage implementation. Located on the east side of their adjacent sites, LVOC's primary goal is to foster innovation and collaboration between the National Laboratories and other research entities, including public and private universities, and private sector industries or companies. The facilities on the campus will be open to scientists and engineers, free of the conventional security burdens that restrict site access and inhibit communication.

The ambitious plan creates a new combined campus organized around three village centers: the North Village Center on the LLNL site, the Campus Collaboration Core, and the South Village Center on the SNL/CA campus. Each village center is adjacent to an anchor program within the National Laboratory. The campus plan identifies potential sites for new buildings and multi-story parking facilities, as well as new roadways, pedestrian features, and native landscaping.

Private developers or line-item federal funding could construct LVOC's new structures. Third-party developers could lease facilities back to Sandia or LLNL for use by low-security programs, or lease the facilities back to private sector companies to support collaboration with the scientists at the National Labs.

F-06: Concept for Livermore Valley Open Campus (LVOC)

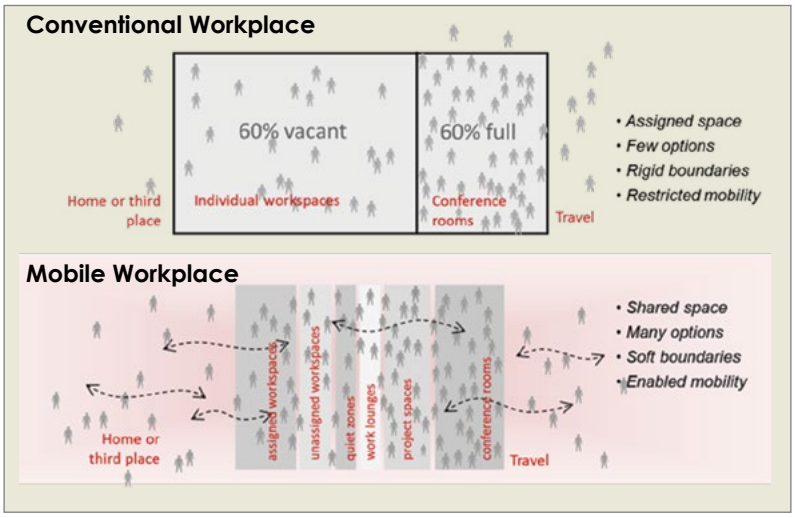


Creating Flexible, Innovative Workplaces

Sandia should create work environments that effectively support the current workforce and demonstrate a commitment to sustainability practices. Sandia should examine responsive design strategies and concepts for new construction, or for opportunities that arise to renovate existing space.

Improve productivity by providing flexible workspaces that are adaptable and can respond to new requirements, provide a healthy work environment, and are sustainable.

F-07: Mobile Workplace and Office Space Design



A major consideration when designing and allocating space should be workplace employee mobility. Internal mobility is the periodic movement between work settings, whether natural or induced. Analyzing how and when employees move during their daily routines will allow Sandia to better understand its long-term space needs. A visual comparison of the differences between the "Mobile Workplace" and "Conventional Workplace" frameworks is in figure F-07.

Harnessing the world-class facilities and resources available within specific sub-areas of the New Mexico and California campuses can catalyze further programmatic growth.

Sandia has made substantial progress in determining the extent of campus reconfiguration necessary to meet its collaboration objectives and serve a new generation workforce.

F-08: Case Study – Renovation of C912 at SNL/CA

With limited funding for new construction, SNL is focusing on improvements to existing facilities and infrastructure; especially with respect to enhancements that improve building operation efficiency as well as efficient use of space. The renovation of Building C912 represents a holistic renovation approach that meets customer needs and security requirements while also creating more efficient environments for the building users and reducing operating costs.

Physical Site Security Framework

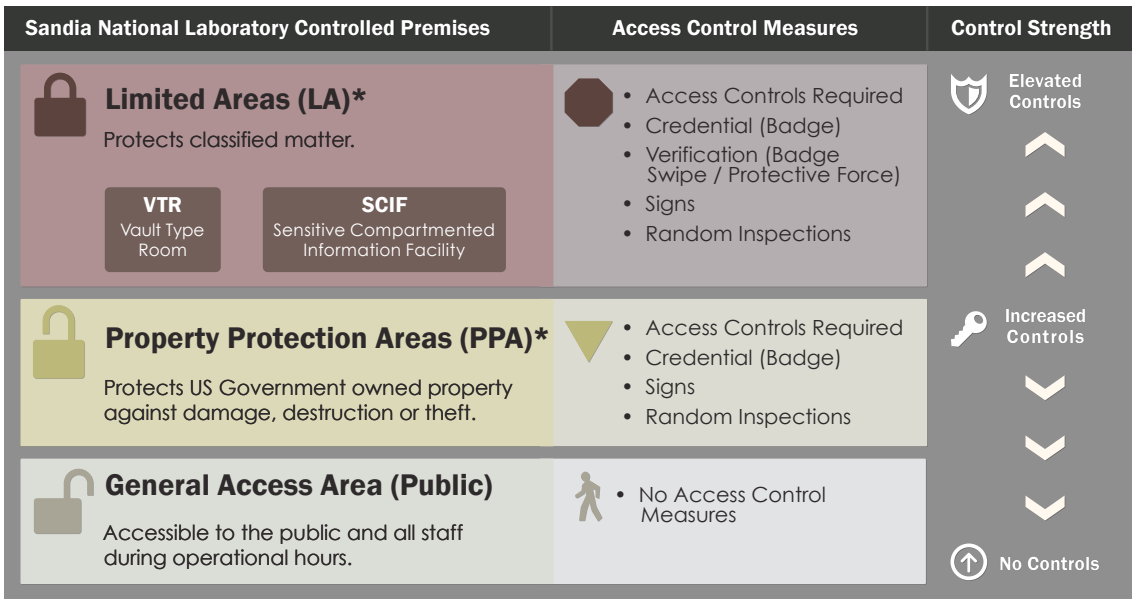
Sandia's various missions call for premises with differing levels of security. Some require the highest levels of physical and cyber security protection, while others depend on transparency and connection to the outside world. The LRDF maintains the three-tiered hierarchical security framework currently in place, but recommends future rebalancing of these oppositional demands by redefining various security areas at both sites.

Balance diverse and changing needs for secure and open work environments.

Physical security at both the New Mexico and California sites would continue to be based upon a three-tiered hierarchical structure:

- General Access Areas (GAA) accessible to all personnel, including the public during operational hours
- Property Protection Areas (PPA) that protect U.S. government-owned property against damage, destruction, or theft — access to this area requires proper credentials
- Limited Areas (LA) with the highest level of security enforcement can be designated for building footprints or sub-areas to protect classified matter — entry requires badging and verification measures. LAs can be created within a PPA based on programmatic request. A secured area within a PPA would enforce maximum levels of access restriction at the building envelope level or at the site level, as required by the type of work conducted there.

F-09: Three-Tier Site Security Hierarchy

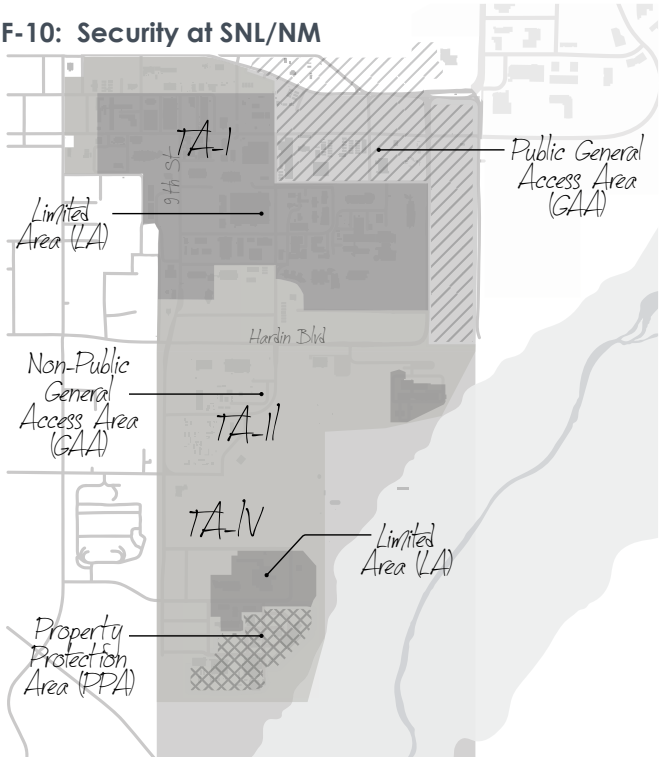


*Limited Areas (LAs) can be created within a PPA based on programmatic request, and boundaries may shift, based on programmatic need.

New Mexico Site

At the New Mexico site, the LRDF calls for creation of a General Access Area to enhance external collaboration opportunities and reduce land ownership restrictions, helping to activate private investment for development. Planners studied this concept extensively several years ago during development of the TA-I Sub-Area Plan and during examination of alternative financing for capital construction. Relocation of the KAFB Eubank gate to enable the creation of a General Access Area requires extensive study, dialog, and ultimate approval from the U.S. Air Force and Department of Defense, but could greatly benefit both mission work involving external collaborations and private sector financing of future facilities.

F-10: Security at SNL/NM

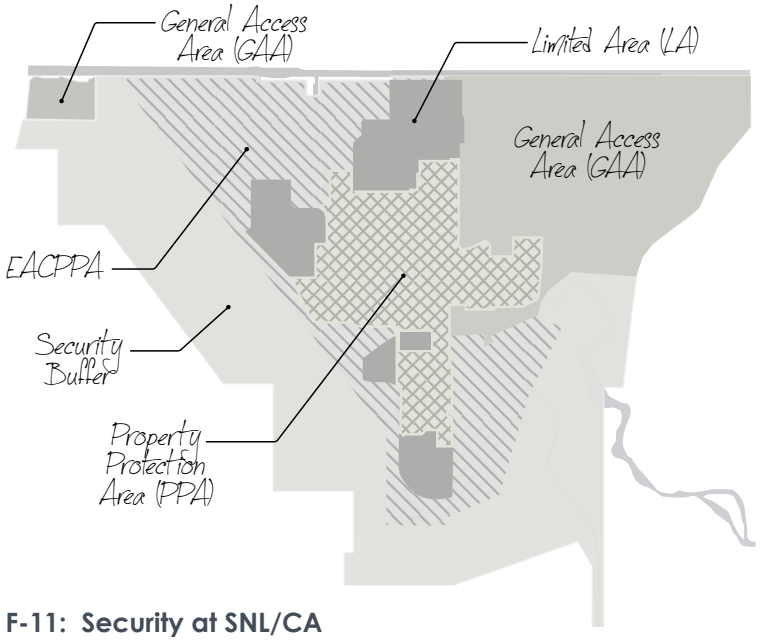


California Site

SNL/CA also has three security areas: a GAA, PPA, and LA, all of which include buildings with offices and laboratory spaces. Additionally, a Security Buffer Zone wraps around the occupied areas of the site on the west, south, and east.

With the closure of East Avenue in 2003, SNL/CA established, in cooperation with LLNL, an additional security zone called the East Avenue Corridor Property Protection Area (EACPPA). Comprising this area is undeveloped land between the Security Buffer and the PPA boundary, which is contiguous across East Avenue with the PPA at LLNL. Portions of the Security Buffer and the EACPPA reside in a Wildlife Reserve Buffer, a land category containing open space in an undisturbed a natural environment.

The LRDF supports changing the relative sizes of the GAA, PPA and LA security zones over the next ten years, in response to anticipated growth in classified programs and the development of the Livermore Valley Open Campus (LVOC). Details about the background and implementation of this security sizing adjustment are in SNL/CA's *Site Development Plan*.

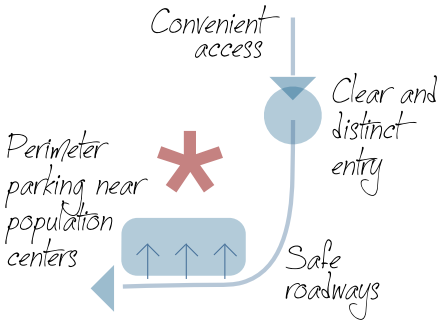


F-11: Security at SNL/CA

Access, Circulation, and Parking

The objective of the vehicular circulation system is to provide convenient access to the campus to and from the surrounding community with well-defined major entries. Once on campus, visitors and Sandia staff will travel on safe, low-speed roadways to perimeter parking within easy reach of campus population areas.

Provide convenient access to Sandia with well-defined entries and safe roadways with perimeter parking near campus population areas.



New Mexico Site

The LRDF seeks to clearly define major entrance points to the campus from Gibson, Wyoming and Eubank Boulevards. Edge landscape treatments, signing and other features could clearly articulate a sense of arrival at the campus.

Traffic studies indicate that the major arterials that currently serve Sandia and KAFB will continue to have adequate capacity for the campus during the next 20 years.

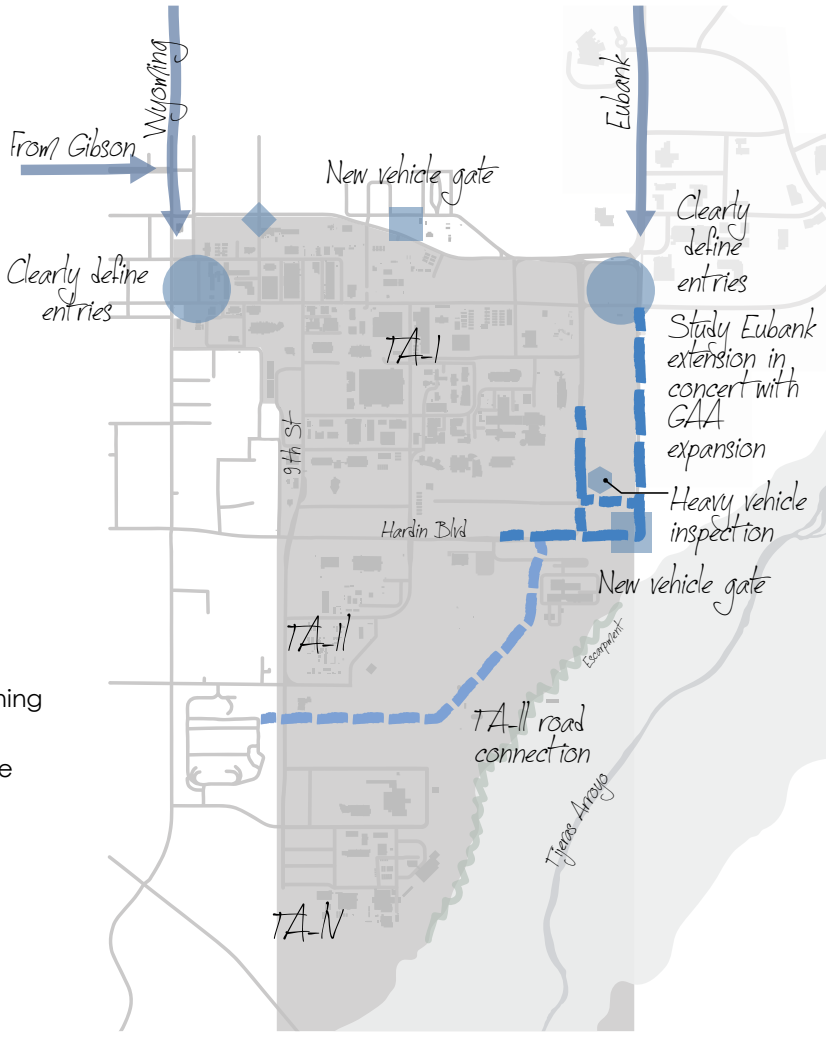
Eubank Boulevard provides the best opportunity to create a clear and distinct entry to Sandia. Issues that require further study are associated with the possible creation of a General Access Area in the northeast portion of TA-I, relocation of the existing Eubank gate to the west, construction of a new vehicle gate if Eubank extends to the south, and relocation/construction of a commercial vehicle gate south of the existing facility.

Connecting Hardin Boulevard south and westward through TA-II to 9th Street will facilitate access as TA-II redevelops.

To advance the objective of establishing a more pedestrian-friendly campus, long-term planning should discourage internal high-speed vehicular traffic.

As parking demand increases, and funding becomes available, Sandia could place a few new parking structures near major arterials with convenient links to pedestrian paths.

F-12: Circulation System at SNL/NM



California Site

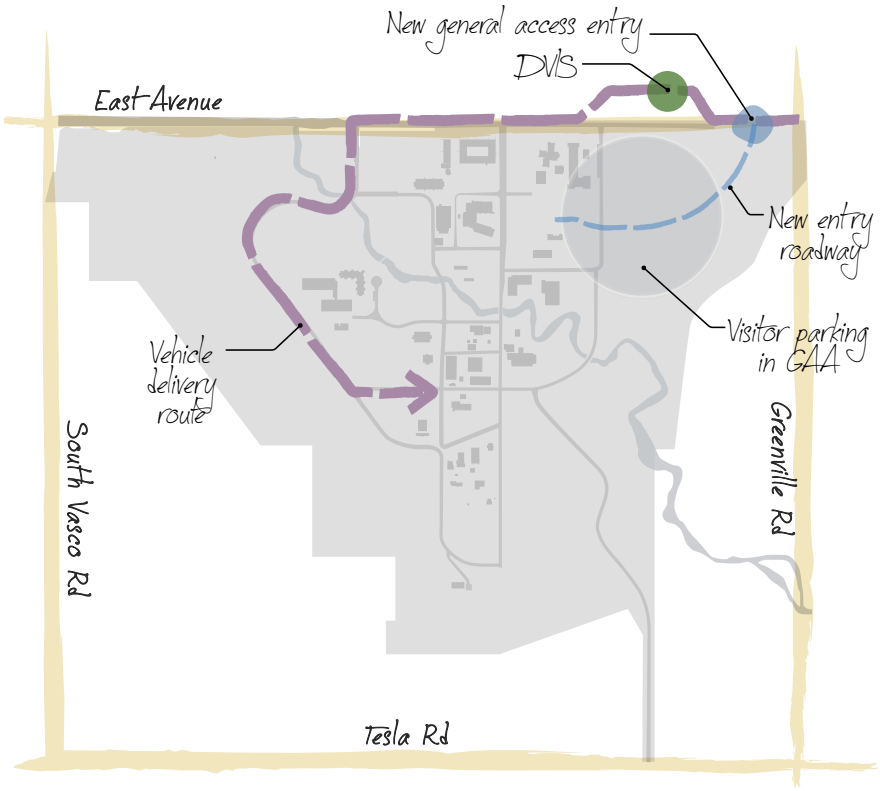
When SNL/CA was established, the main entrance to the campus was on East Avenue, accessed from South Vasco Road. The main gateway was at Building 911, with visitors parking in the lots just west of the building. With the closure of the one-mile segment of East Avenue between South Vasco and Greenfield Roads, the California site lost public access to its front door and the visitor amenities at that location lost much of their functionality.

As a result of the road closure, SNL/CA moved all visitor badging, security checkpoint, parking, and a bus turnaround to the western edge of its site at the intersection of East Avenue and South Vasco. While functional, this solution isolates these functions from the other parts of the campus and lacks a welcoming image.

To address this situation, the SNL/CA Site Development Plan makes two major recommendations:

- Create a new entry for the site that does not rely on East Avenue and brings visitors and employees directly to a Visitor Badge Office from where they may walk to their destination, and
- Facilitate the immediate expansion of the General Access Area on the east side of the site to open selected programs and activities to unrestricted collaboration with the private sector, representing the first phase of the Livermore Valley Open Campus project.

F-13: Vehicular Access at SNL/CA

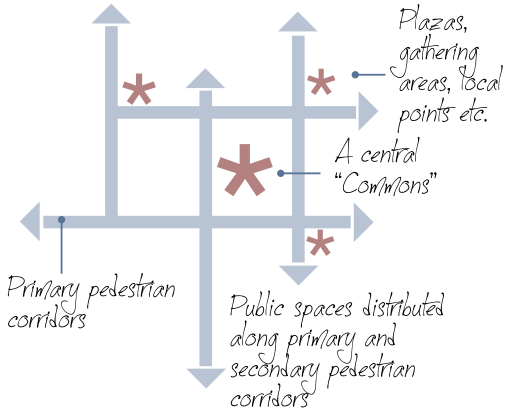


Deliveries to the campus will continue to enter from the east end of East Avenue. All delivery vehicles pass through LLNL's Delivery Vehicle Inspection Station (DVIS), and proceed to the LLNL shipping and receiving warehouse where SNL/CA picks them up. Sandia delivery vehicles then continue around the west side of the site and into the Sandia PPA. While this entrance path is circuitous, it avoids crossing the GAA on the east side of the site and the LA in the central portion of this site.

Pedestrian Circulation and Outdoor Areas

The LRDF seeks to promote a pedestrian-friendly environment at all Sandia sites. The revitalized campus interior would have pleasant landscaped pedestrian pathways within a hierarchy of outdoor "public" areas dispersed throughout the site, encouraging employee interactions, outdoor meetings, and recreation.

Promote a pedestrian-friendly environment with pleasant landscaped walkways within a hierarchy of outdoor public spaces.



The pinnacle in this hierarchy of outdoor public space is a commons or center that provides a heart and soul for the campus. Sandia staff and visitors would also have access to smaller outdoor public areas distributed throughout the campus.

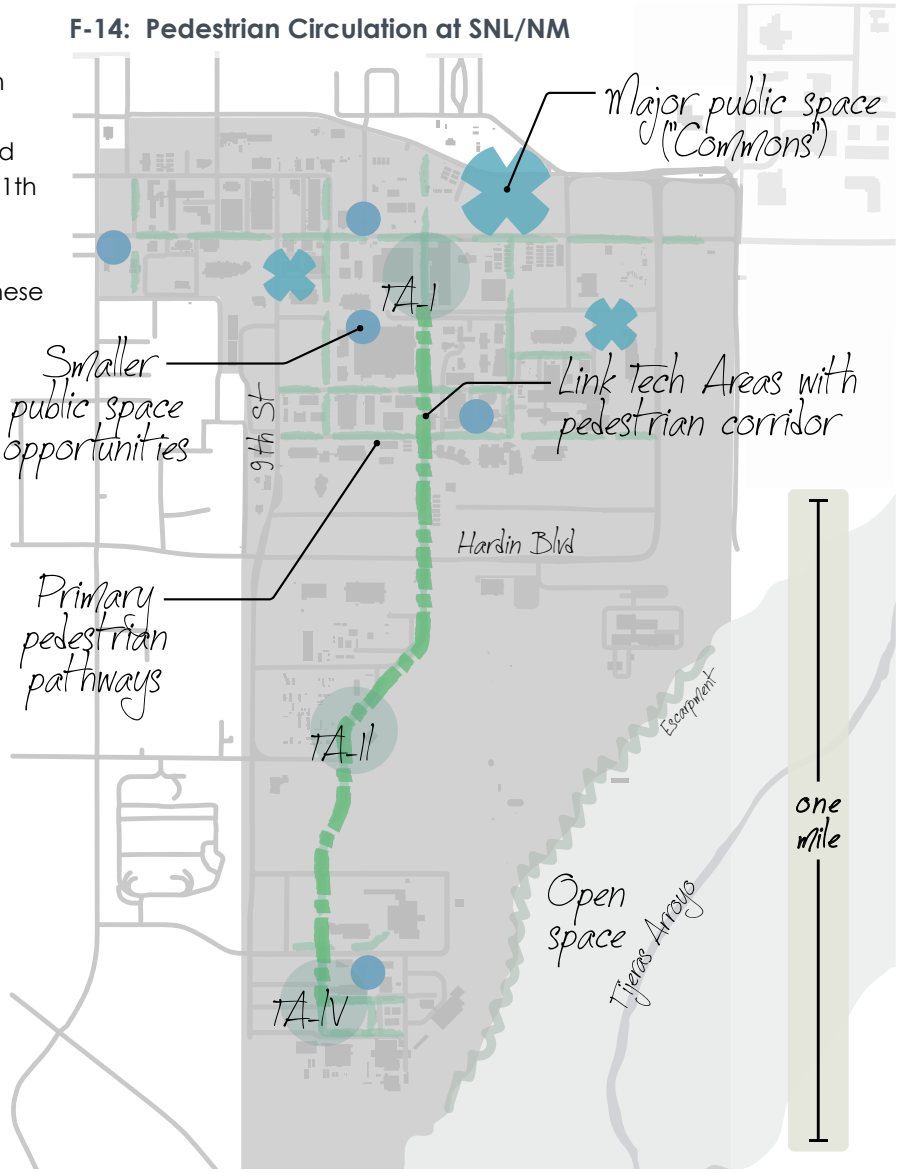
New Mexico Site

TA-I has a well-established system of primary pedestrian corridors and associated public plazas and gathering areas. Currently, the 11th Street pedestrian mall and 14th Street corridor serve TA-I's major north-south pedestrian routes. These major pedestrian facilities are linked to major east-west facilities along H and M Avenues.

The LRDF recommends that Sandia continue to enhance these existing pedestrian corridors and complete any gaps in the system. The major gap is to complete the 14th Street corridor southward to link TA-I to TA-II and TA-IV.

There is an opportunity to create a campus commons on the northeast quadrant of TA-I as this area redevelops to accommodate mission headquarters, administration and employee support services.

F-14: Pedestrian Circulation at SNL/NM



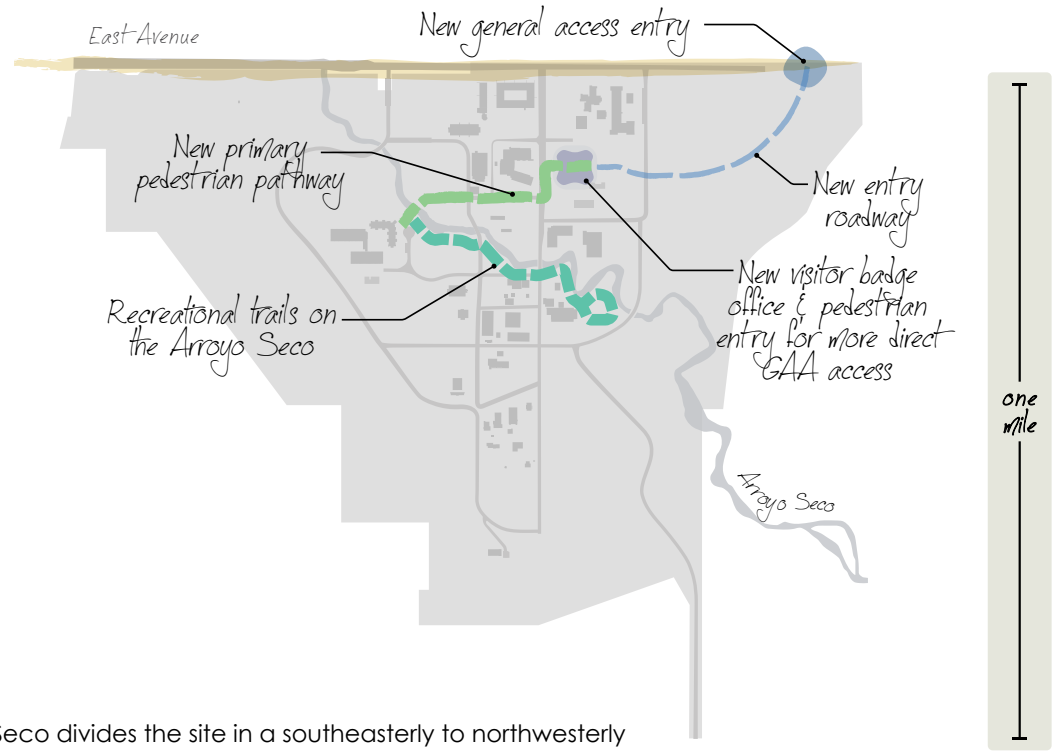
The spaces between buildings represent an opportunity to encourage informal open spaces using smaller land parcels in the developed areas. These spaces can link to pedestrian paths and plazas.

The Tijeras Arroyo escarpment in TA-II provides a unique opportunity to enhance wildlife habitat on the campus and establish recreational trails. SNL would restore the arroyo where possible, and limit development to essential roadways. These open spaces provide possibilities for recreational trails for walking, jogging, and biking.

California Site

SNL/CA seeks to improve and enhance its established pedestrian and public space network by developing a main east-west pedestrian circulation spine from the new front door. The pedestrian spine would link the new entrance, that could serve as a campus commons to the rest of the campus. The existing network of pedestrian walkways and bike paths on campus will be redesigned and existing gaps filled.

F-15: Pedestrian Circulation at SNL/CA



The Arroyo Seco divides the site in a southeasterly to northwesterly direction. The channel carries water during the rainy season in the winter and spring, and is dry in the summer and fall. The State of California has designated this largely natural channel as a waterway and wildlife corridor, requiring its preservation in its natural state. Site plans show it as a natural resource corridor that presents an excellent opportunity for the development of recreational walkways coordinated with natural landscaping.

Sustainability and Environmental Stewardship

The LRDF supports the application of energy reduction and sustainability practices in site development, project design and operations — specifically:

- Development of clean energy infrastructure for research and development, as well as energy production and consumption
- Use of ecological footprint models as tools to support decision making related to site selection, site development, transportation-related issues, and site operations
- Leadership in engineering and future-oriented design by adopting sustainable development practices, technology, policy, and planning
- Use of Sandia facilities as working laboratories to demonstrate and monitor the performance of new technologies and approaches developed and tested through Sandia missions

Support energy reduction and sustainability practices in site development, project design and operations as good business practices.

Long-term development of the New Mexico and California campuses should adhere to best environmental practices not only because adherence is frequently required by law, but because it makes good business sense. Evidence abounds regarding the long-term cost savings inherent in environmentally responsible operations. In addition to spending less, Sandia stands to achieve added safety and security benefits by employing environmentally responsible practices at its sites.

Sandia will continue to employ the National Environmental Policy Act (NEPA) process as a tool to effectively identify environmental concerns associated with project and site development, and identify appropriate remediation. Long- range development of the sites will continue to be carefully coordinated with both Sandia's Environmental Management System (EMS) and Resource Management Planning.

Site development impacts sustainability in direct and indirect ways. A major goal of the LRDF is to advance site design that supports all aspects of Sandia's sustainability programs, including:

- Decreasing greenhouse gas emissions by reducing the need for personal vehicle use (Methods include making sites easily accessible, and improving food service and recreational opportunities to alleviate the need to travel off site at lunch time)
- Reducing or eliminating site water consumption by using native plants and drought-tolerant landscaping
- Using energy-efficient site lighting to save power and reduce greenhouse gas emissions
- Encouraging compact development of campuses to limit sprawl and preserve open space
- Preserving natural features and wildlife habitat such as the wildlife reserve and Arroyo Seco corridor at the California site and the Tijeras Arroyo at the New Mexico site
- Reducing heat islands by removing unnecessary paving

Environmentally Sensitive Areas

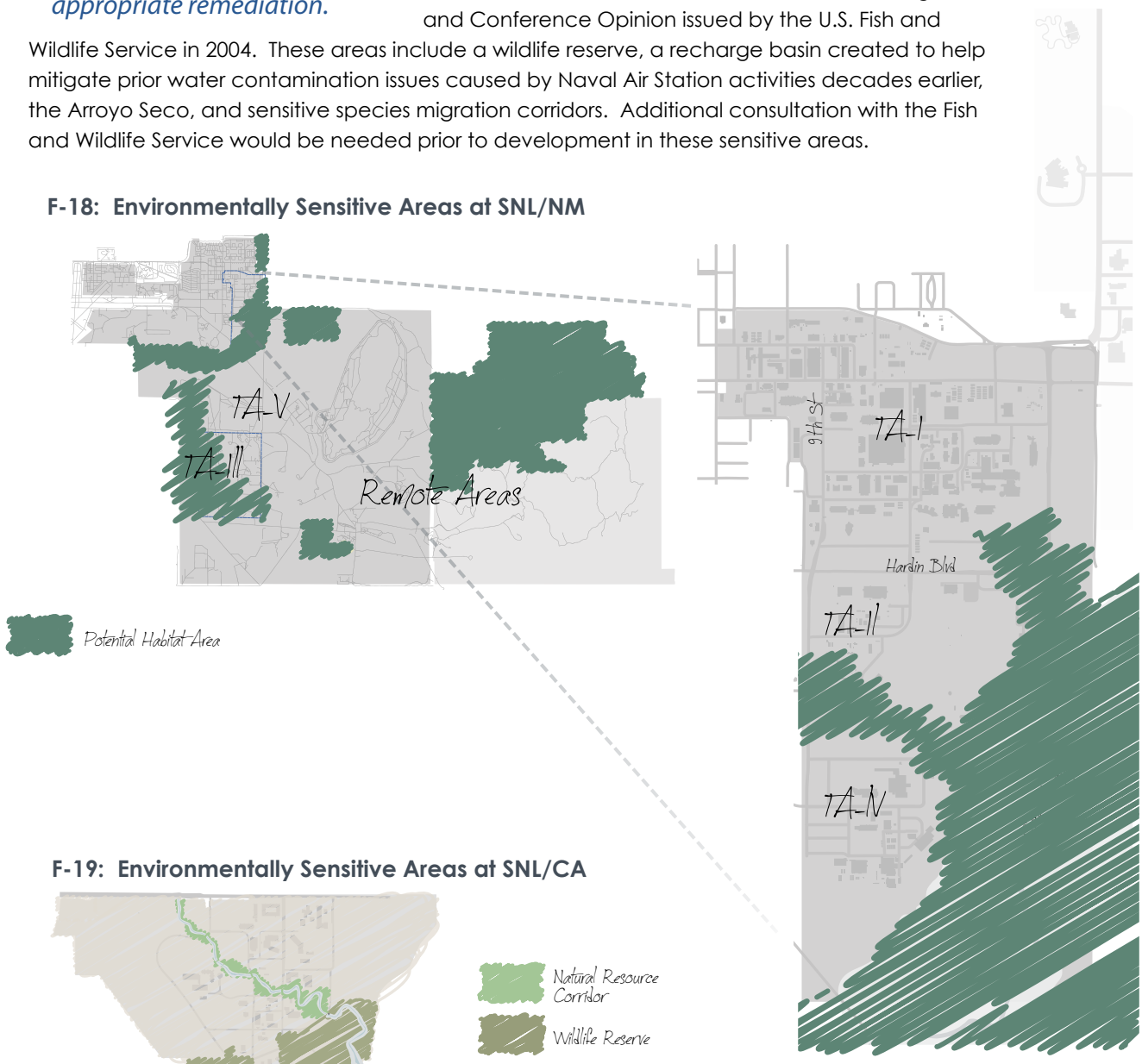
Long-term development of Sandia sites should include consideration of environmentally sensitive areas, in the the siting and design of individual projects.

Continue to identify environmental factors associated with project and site development, and employ appropriate remediation.

At SNL/NM, areas have benn identified as containing varying qualities of habitat. Development of these areas will be coordinated with Sandia environmental programs. [1]

At SNL/CA, sensitive areas are identified in a Biological and Conference Opinion issued by the U.S. Fish and Wildlife Service in 2004. These areas include a wildlife reserve, a recharge basin created to help mitigate prior water contamination issues caused by Naval Air Station activities decades earlier, the Arroyo Seco, and sensitive species migration corridors. Additional consultation with the Fish and Wildlife Service would be needed prior to development in these sensitive areas.

F-18: Environmentally Sensitive Areas at SNL/NM



F-19: Environmentally Sensitive Areas at SNL/CA

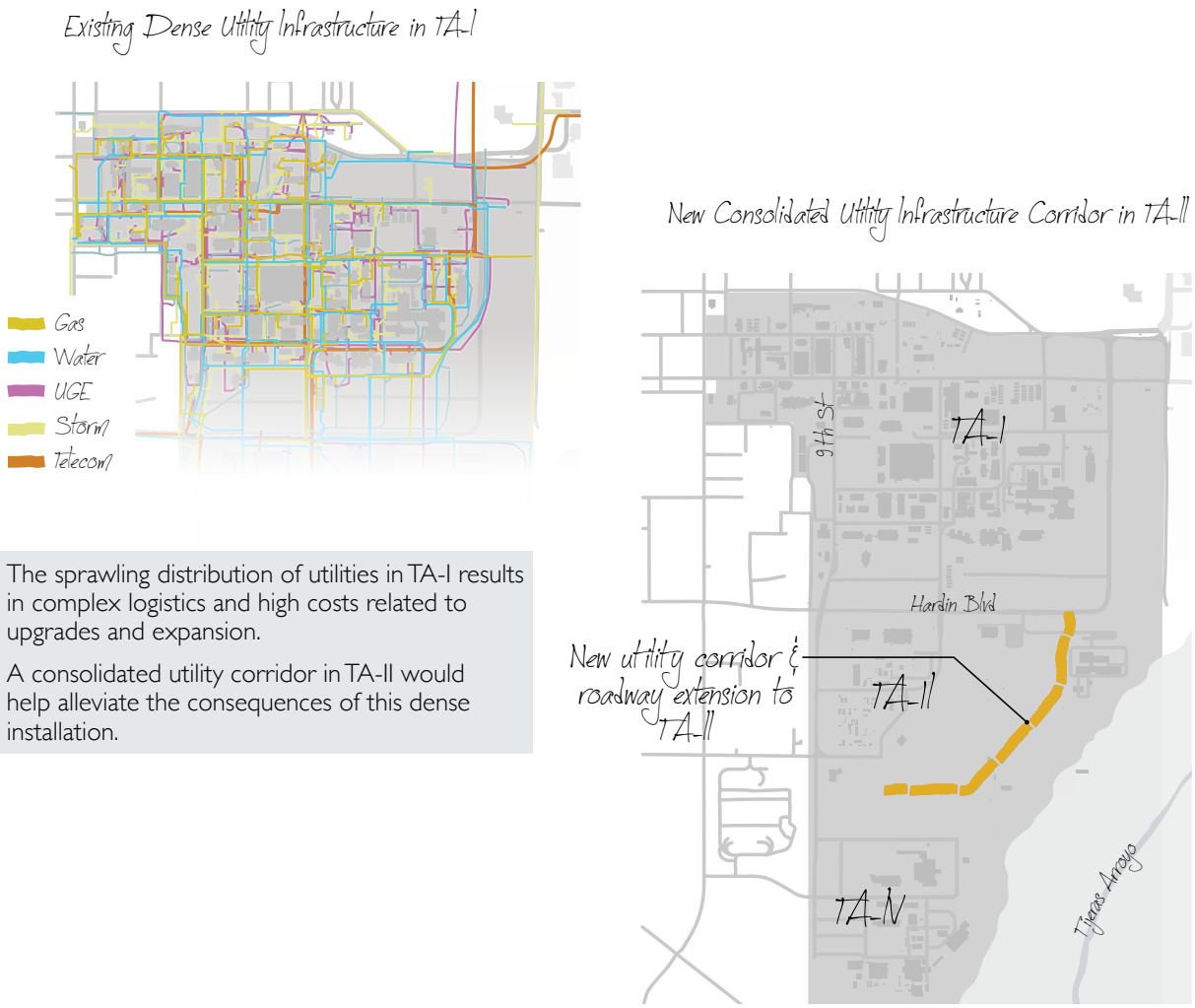
Utilities / Communications Infrastructure

The LRDF's utilities/communications infrastructure strategy calls for flexible, agile and technically ready systems that accommodate future program missions. Careful initial planning will enable Sandia to install infrastructure at the proper location, and at sufficient size for future extension — thereby minimizing future redesigns and reconstruction, and avoiding costly relocations, resizing, and redundant installations.

Develop coordinated utilities and telecommunications infrastructure site master plans that will advance safe, secure, compliant, and appropriately sized systems to meet mission, program, and workload requirements.

Sandia has made substantial improvements and upgrades to its utilities/communications infrastructure over the years, but many deficiencies remain. These deficiencies decrease Sandia's ability to respond to new mission work and place infrastructure surety at risk. The New Mexico and California sites are now developing coordinated utilities and telecommunications infrastructure site master plans that will advance safe, secure, compliant, and appropriately sized systems to meet current and future NNSA and non-NNSA mission, program, and workload requirements.

F-16: A Consolidated Utility Corridor in SNL/NM TA-II



The sprawling distribution of utilities in TA-I results in complex logistics and high costs related to upgrades and expansion.

A consolidated utility corridor in TA-II would help alleviate the consequences of this dense installation.

Support Services at the New Mexico Site

Historically, facilities associated with site support services have been spread out geographically across the Albuquerque campus and built in an incremental way. These functions include: facilities operations; maintenance; shipping and receiving; visitor badging; delivery/contractor's gate access; security screening services; recycling, disposal and property reapplication; and safety and security operations.

Examine critical support services currently scattered across the site and identify changes needed to ensure optimal efficiency.

Over time, consolidate site support activities in TA-II.

Some of the support services are totally self-contained within the site, but some require interface with off-site operations, personnel and distribution systems. Many of these functions need to interface with the general public, such as deliveries to Sandia or visitors who need access to the campus.

All of the support services have well-defined operations and make use of various internal circulation, collection, and distribution systems. For example:

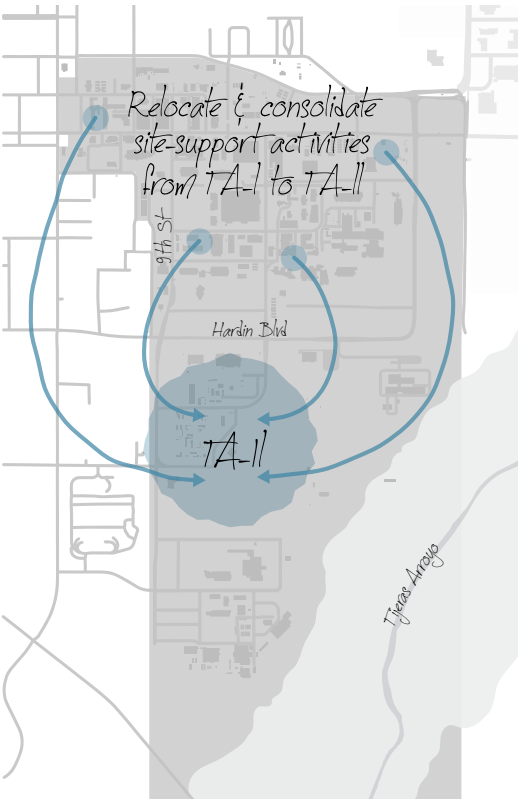
- Shipping and Receiving is located well within the campus, but deliveries and visitors are screened at KAFB gates located on the perimeter of the site.
- Reapplication Services is separated from other recycling functions.
- The Facilities Management and Operations Center has facilities in TA-I and uses premium real estate that could best be used for other purposes.

As a result of the incremental and piecemeal building approach employed over the years to provide support services, many support facilities and operations are unsuitable for the functions performed and are not at desired or optimal locations. Support services currently scattered across the site could be more efficient when consolidated and streamlined.

The LRDF recommends that Sandia architects, engineering and planning staff work with the respective support services organizations to examine current facilities and operations, and identify needed changes to ensure optimal efficiency.

Certain support activities benefit the entire campus, such as Facilities Management and Operations, Site Security, ES&H and so on. The LRDF recommends that over time, these site support activities should be consolidated at TA-II.

F-17: Site Support Consolidation at TA-II



F-18: Heavy Vehicle Inspection Station

This conceptual rendering shows a heavy vehicle inspection station with merged parcel and mail receiving and distribution capabilities.

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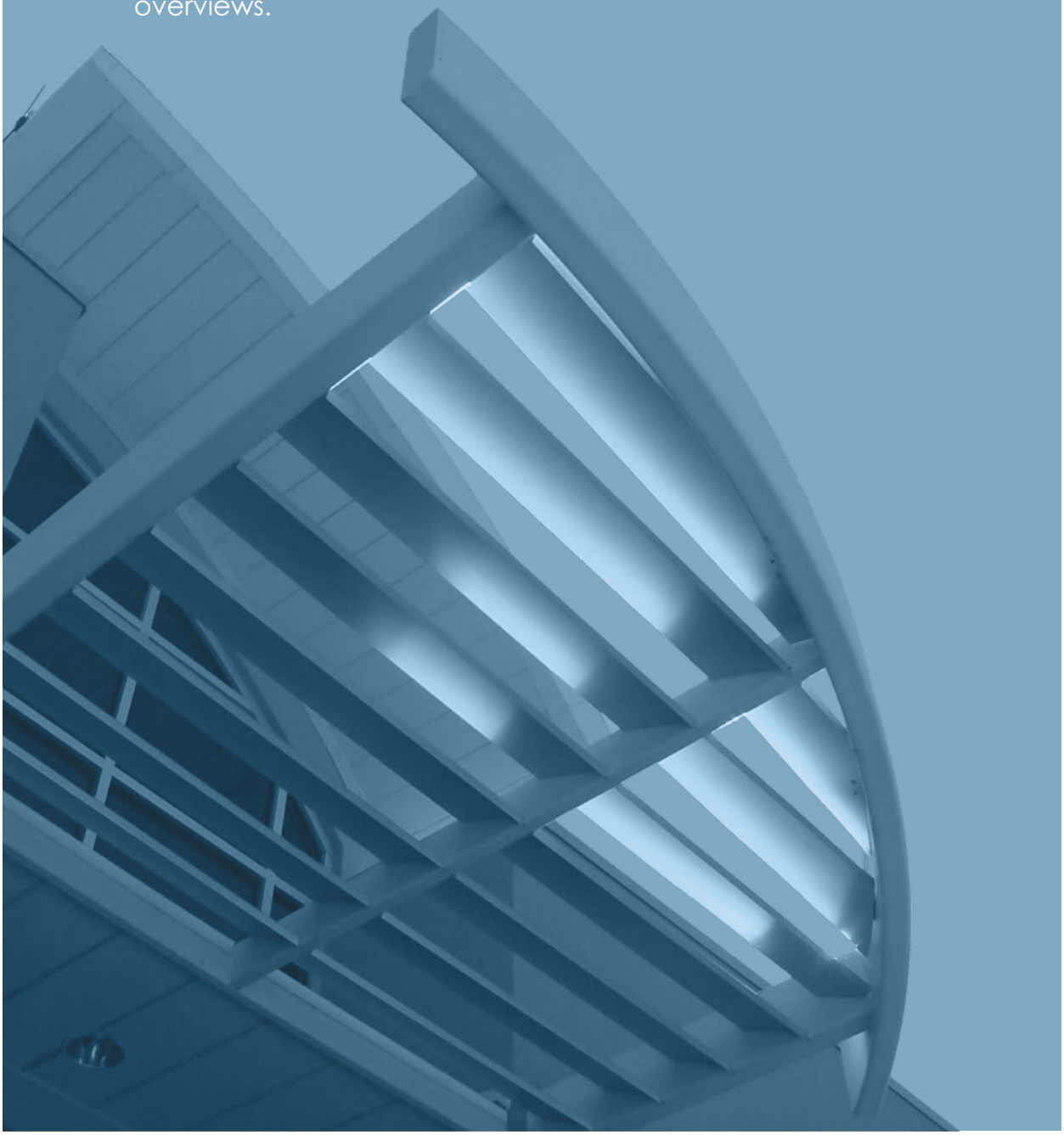
Concept Maps

The following maps summarize LRDF concepts for the SNL/NM and SNL/CA sites. See also companion Sub-Area Plan overviews.



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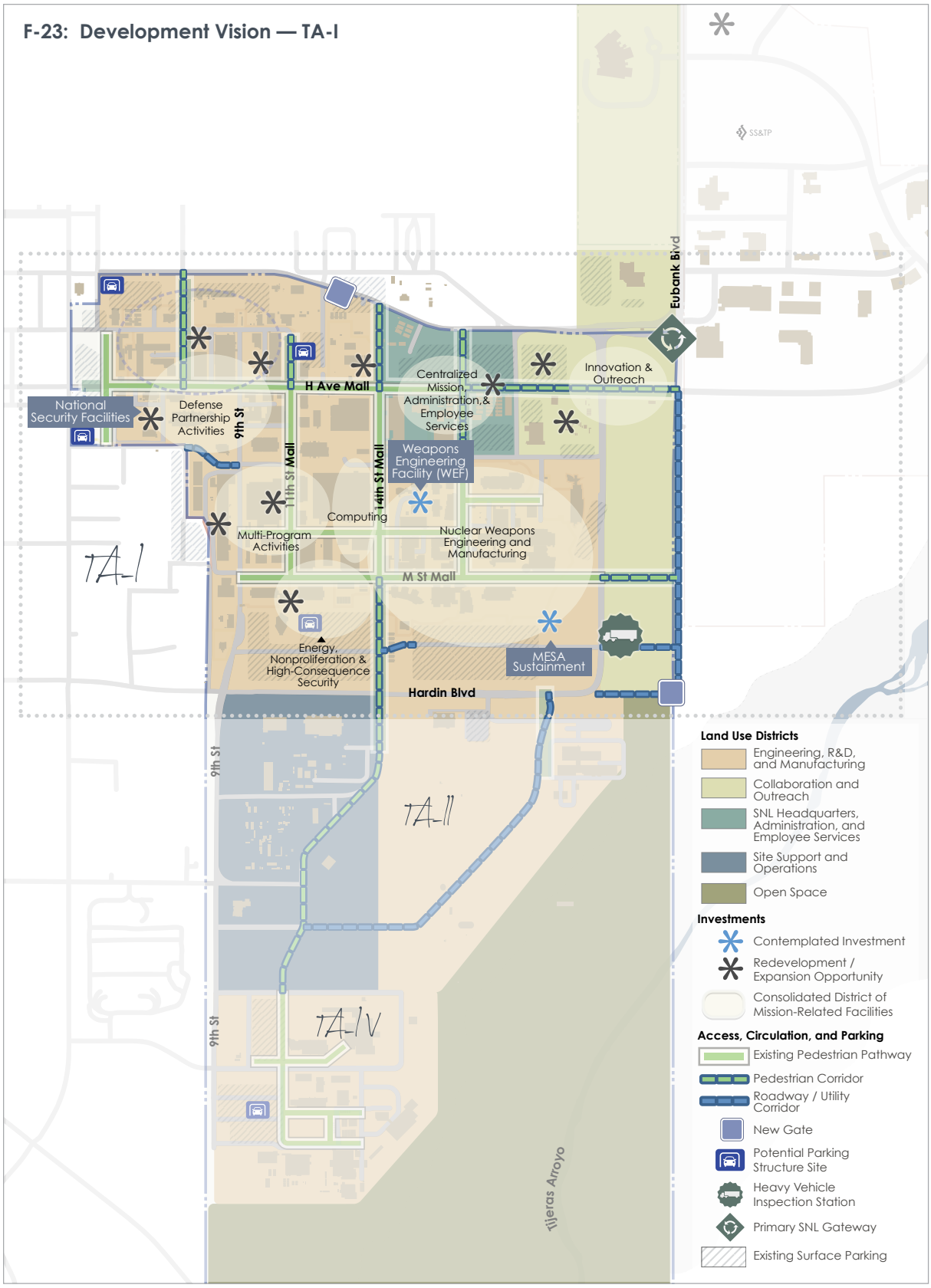
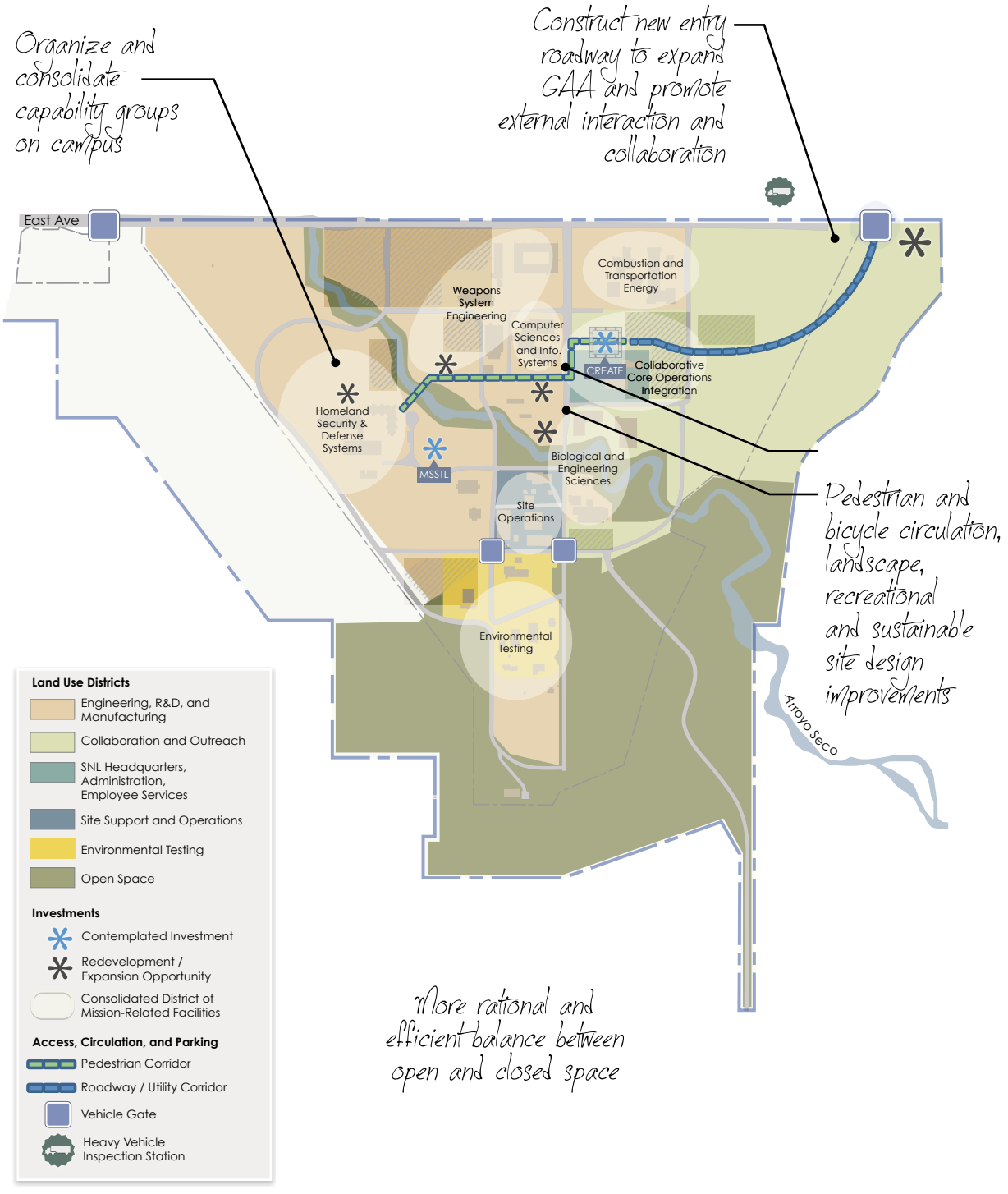
F-23: Development Vision — TA-I



Note: Locations for contemplated investments are notional in nature. If and when the contemplated investments evolve into projects, Sandia's site selection and environmental review processes would help determine specific locations.

F-24: Development Vision for SNL/CA



Note: Locations for contemplated investments are notional in nature. If and when the contemplated investments evolve into projects, Sandia's site selection and environmental review processes would help determine specific locations.

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TA-I

Sub-Area Plan
Overview & Summary

SNL/NM Technical Area I

A Component of Sandia National Laboratories'
Long-Range Development Framework

Developed: 2010
Refreshed: 2015

Sandia National Laboratories

National Nuclear Security Administration

Southeast area of SNL/NM TA-I

Key Features of the TA-I Sub-Area Plan

The Sub-Area plan recognizes that TA-I is the center of Research and Development (R&D) for Sandia and its "crown jewel." The Plan seeks to:

- Maintain (R&D), Manufacturing, and Administration as primary land use
- Create a new "front door" and focus for internal and external interaction
- Organize the site by nature of work / mission focus to enhance functional relationships and cost-effectiveness
- Reshape the security boundary to enhance and simplify the security hierarchy, and open portions of the site for external collaboration
- Preserve opportunities for growth and sustainment of mission by encouraging infill, redevelopment, and consolidation
- Upgrade roadways and walkways to improve site access, circulation and internal logistics, and promote a pedestrian-oriented environment
- Relocate site support activities and functions that do not require a TA-I site ("backyard activities") to make room for program use and external collaboration

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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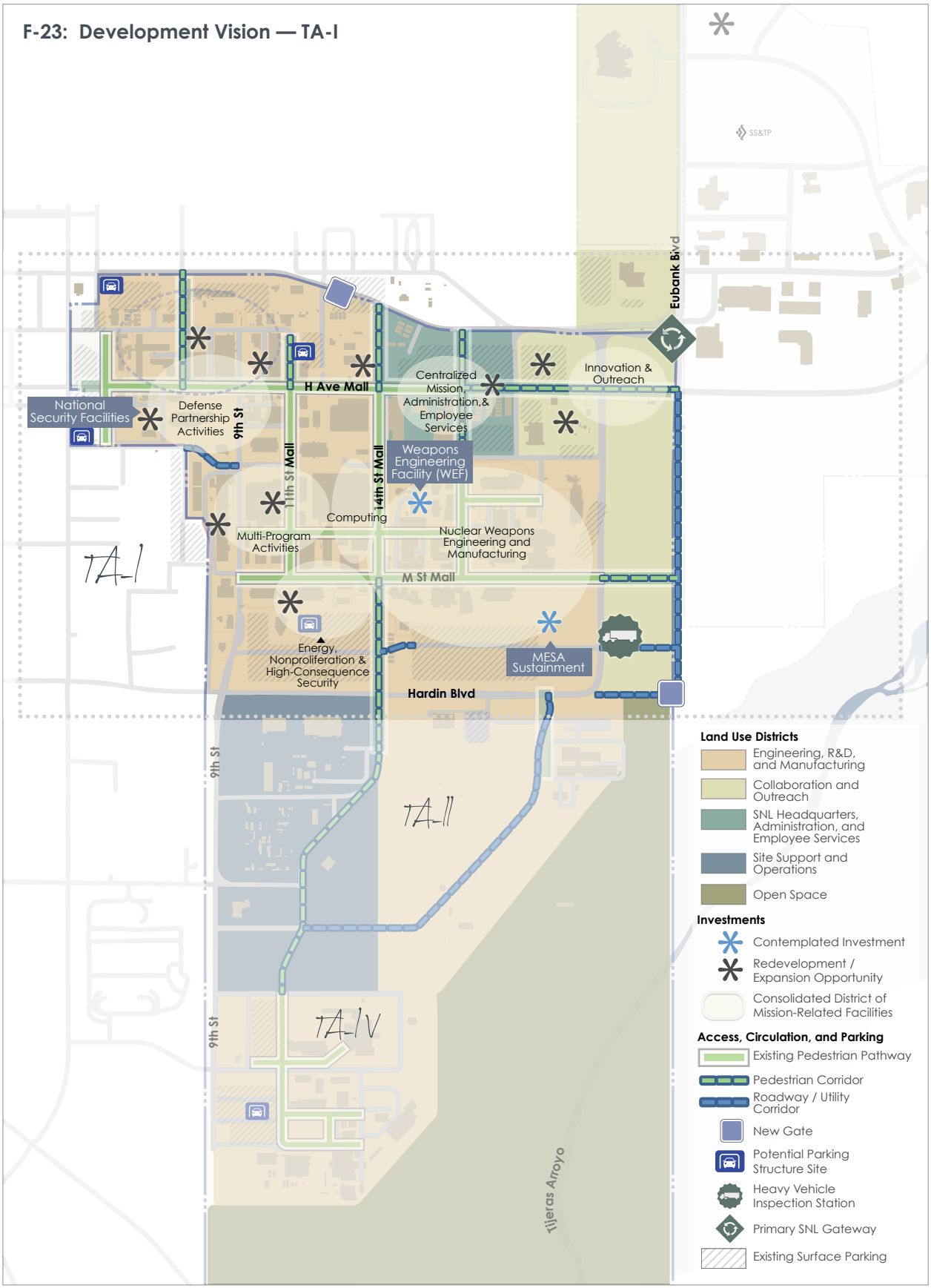
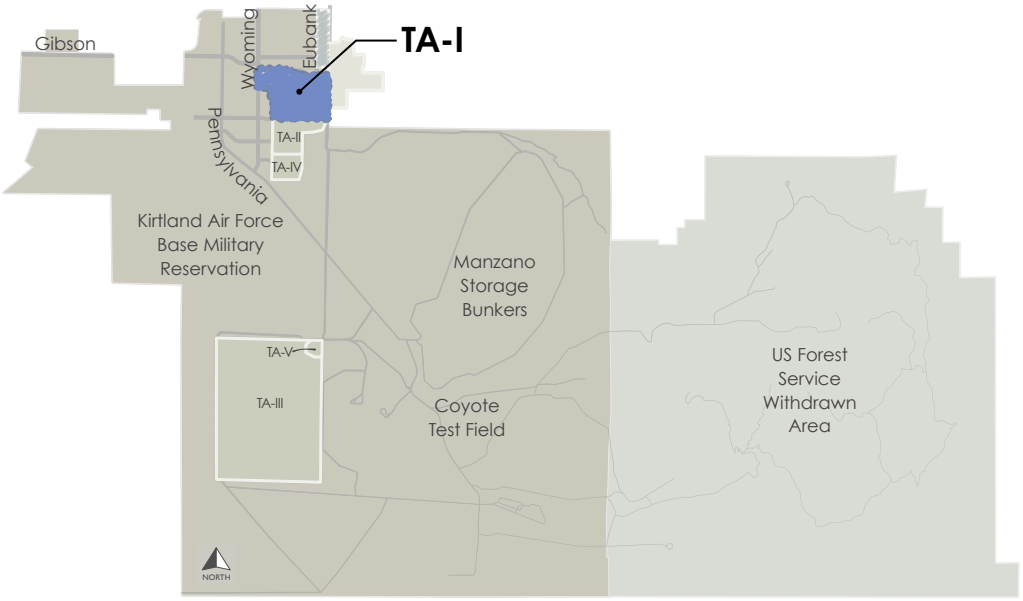
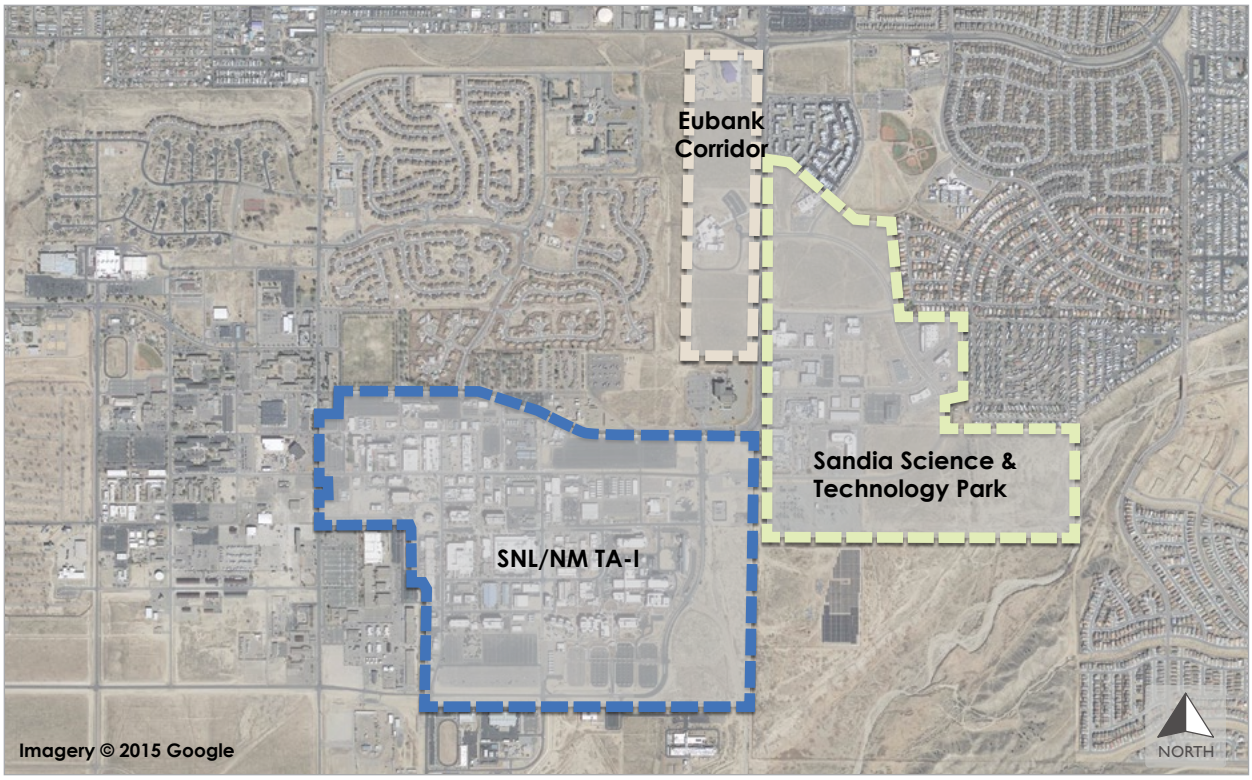
F-23: Development Vision — TA-I



Location

TA-I is Sandia's main population center, accommodating over 80% of its staff and over 70% of its building square footage. Development in TA-I is infill and focused on revitalization of the urban environment. Serving as Sandia's "front door," TA-I primarily houses research and development work and administrative support services.

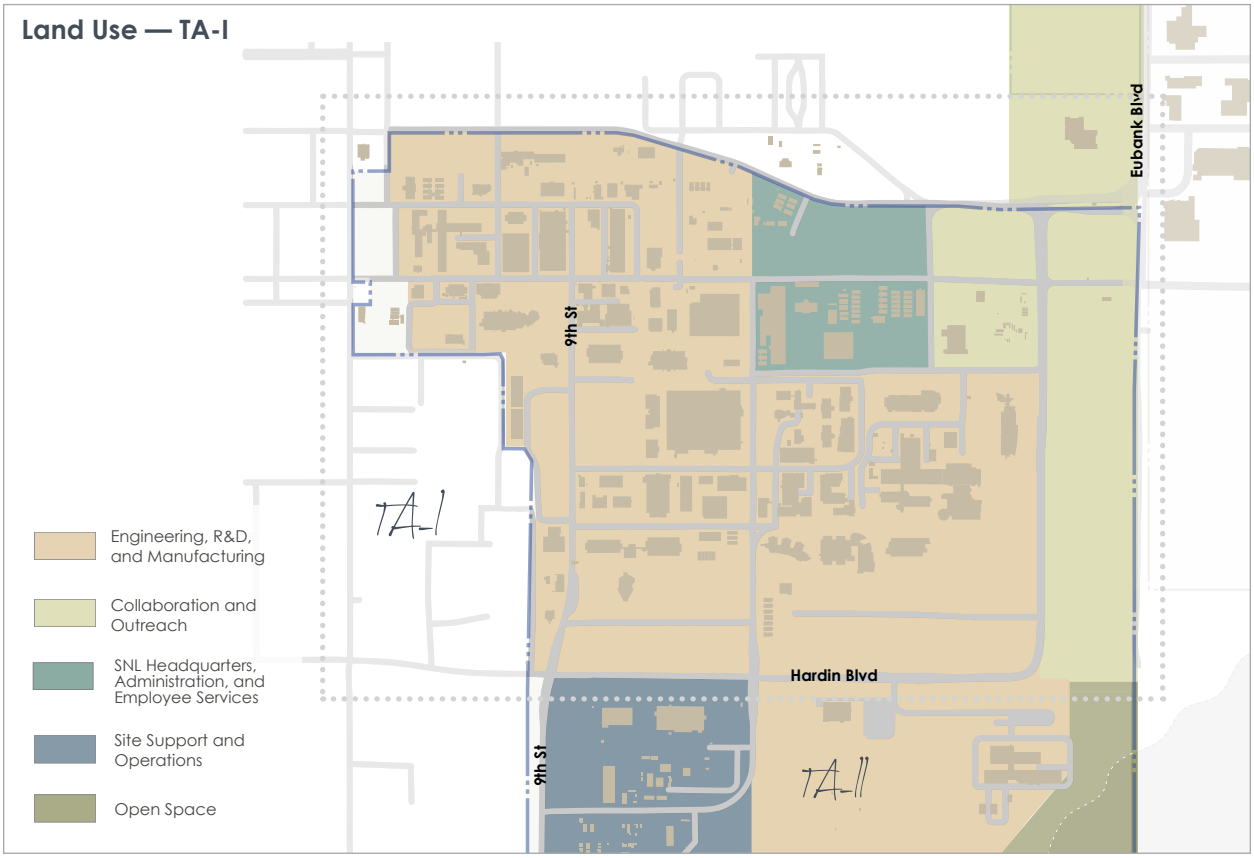




Future Land Use

The primary land use will remain Engineering, R&D, and Manufacturing, but with a new “front door” to provide more opportunities for external interaction and collaboration.

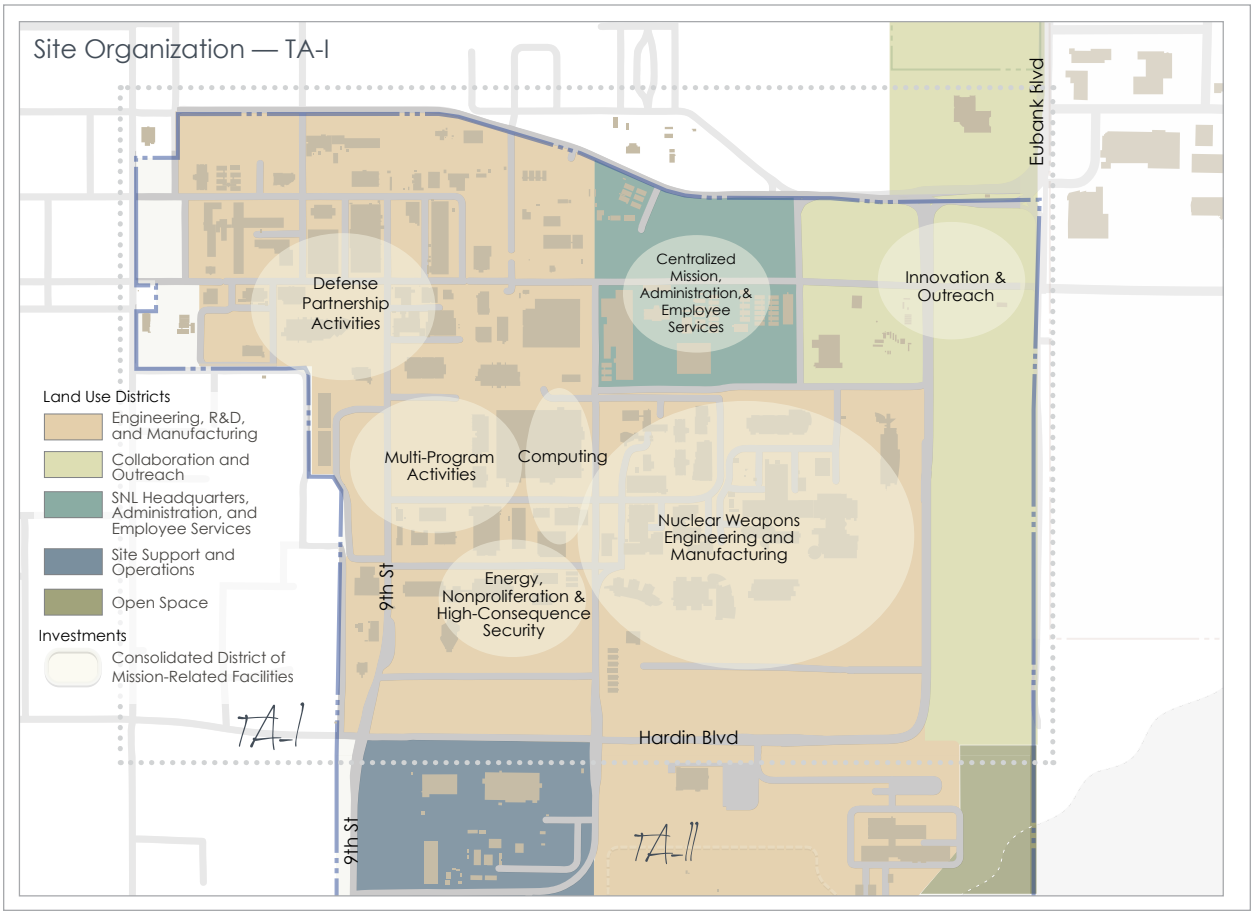
- Primary land use at TA-I will remain Engineering, R&D, and Manufacturing
- Future land use accommodates a Collaboration and Outreach zone on the Eubank Boulevard corridor with an adjacent centralized zone, anticipating consolidation of SNL Headquarters, Administration, and Employee Services



Site Organization

Organize the site by nature of work / mission focus to enhance functional relationships and cost-effectiveness.

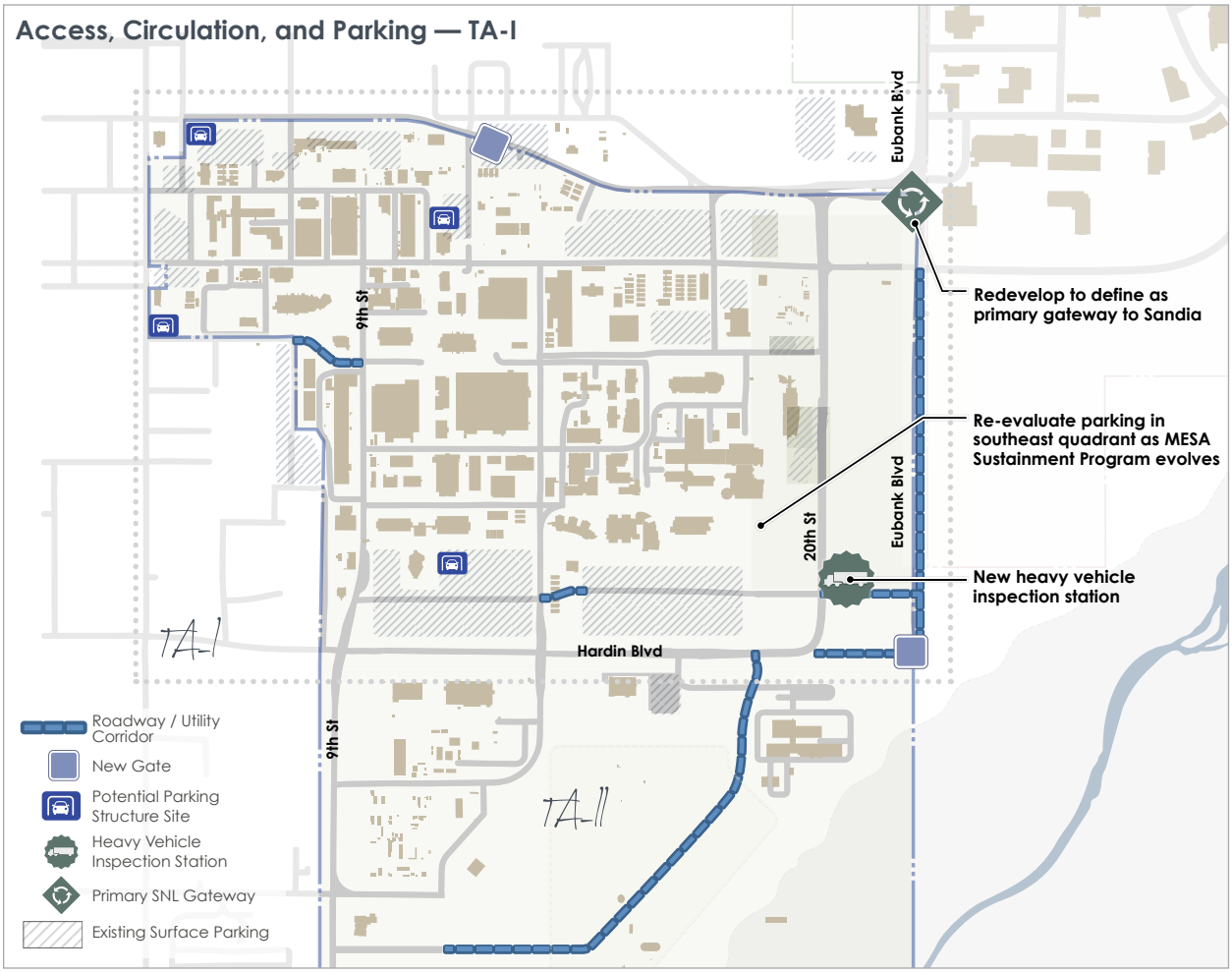
- Organize by mission or capability to capitalize on unique facility capabilities to enhance functional relationships, interaction, collaboration, and overall cost-effectiveness
- Promote external collaboration by locating supporting activities and facilities at Sandia's "front door" on the Eubank Boulevard corridor
- Centralize mission and employee support activities to serve as the "heart" of the campus and to facilitate external interactions
- Relocate site-support activities that do not need a "front door" location



Access, Circulation, and Parking

Upgrade roadways and walkways to improve site access, circulation, and internal logistics, and promote a pedestrian-oriented environment.

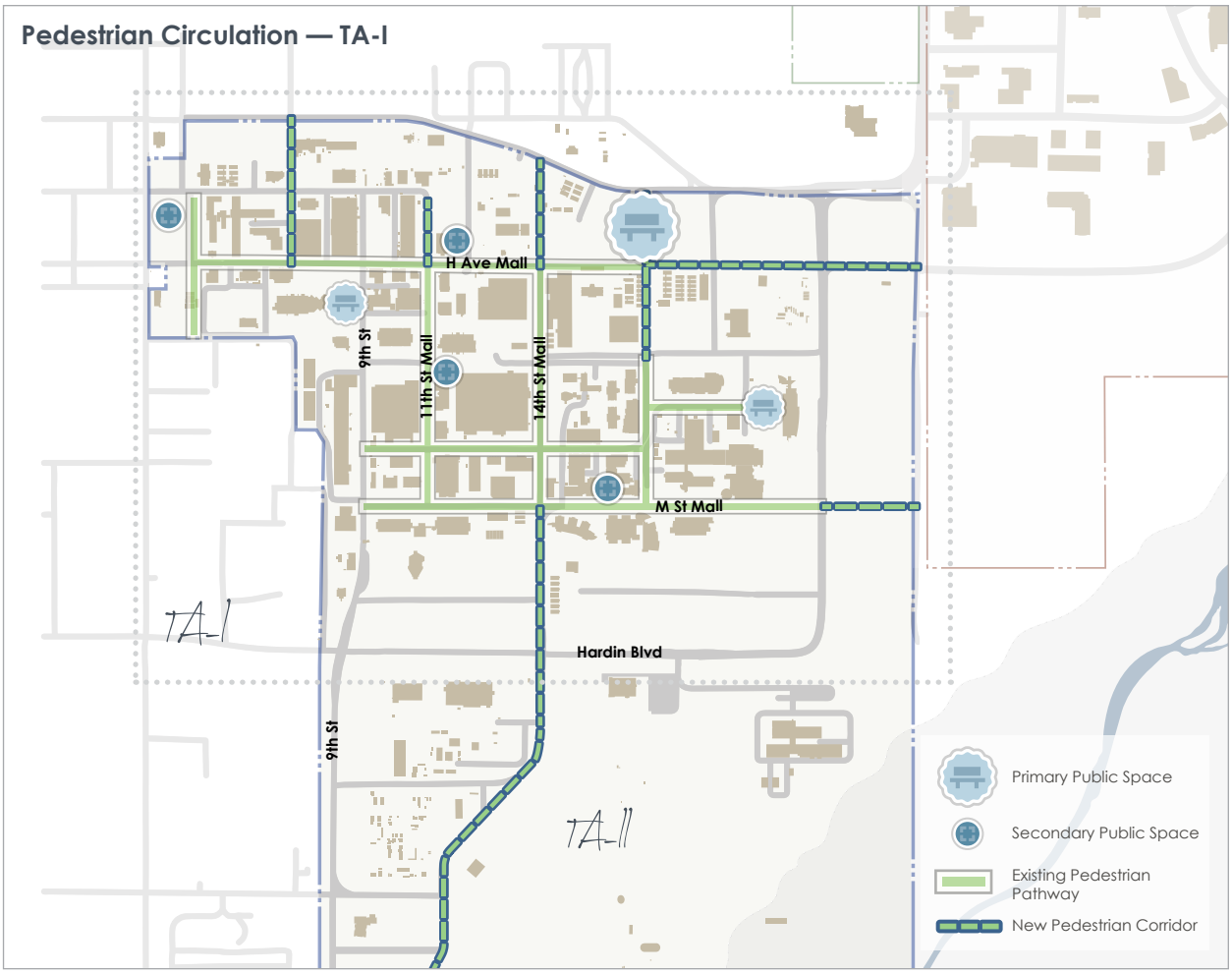
- Create new a gateway and entry to the site for the public from Eubank Boulevard
- Extend Eubank Boulevard and realign 20th Street
- Develop new entry gates into Sandia for staff and visitors
- Accommodate parking structures in the future if they are needed
- Provide a new service access and heavy-vehicle inspection facility on Eubank Boulevard



Pedestrian Circulation and Outdoor Areas

Promote a pedestrian-friendly environment with pleasant, landscaped walkways within a hierarchy of public spaces.

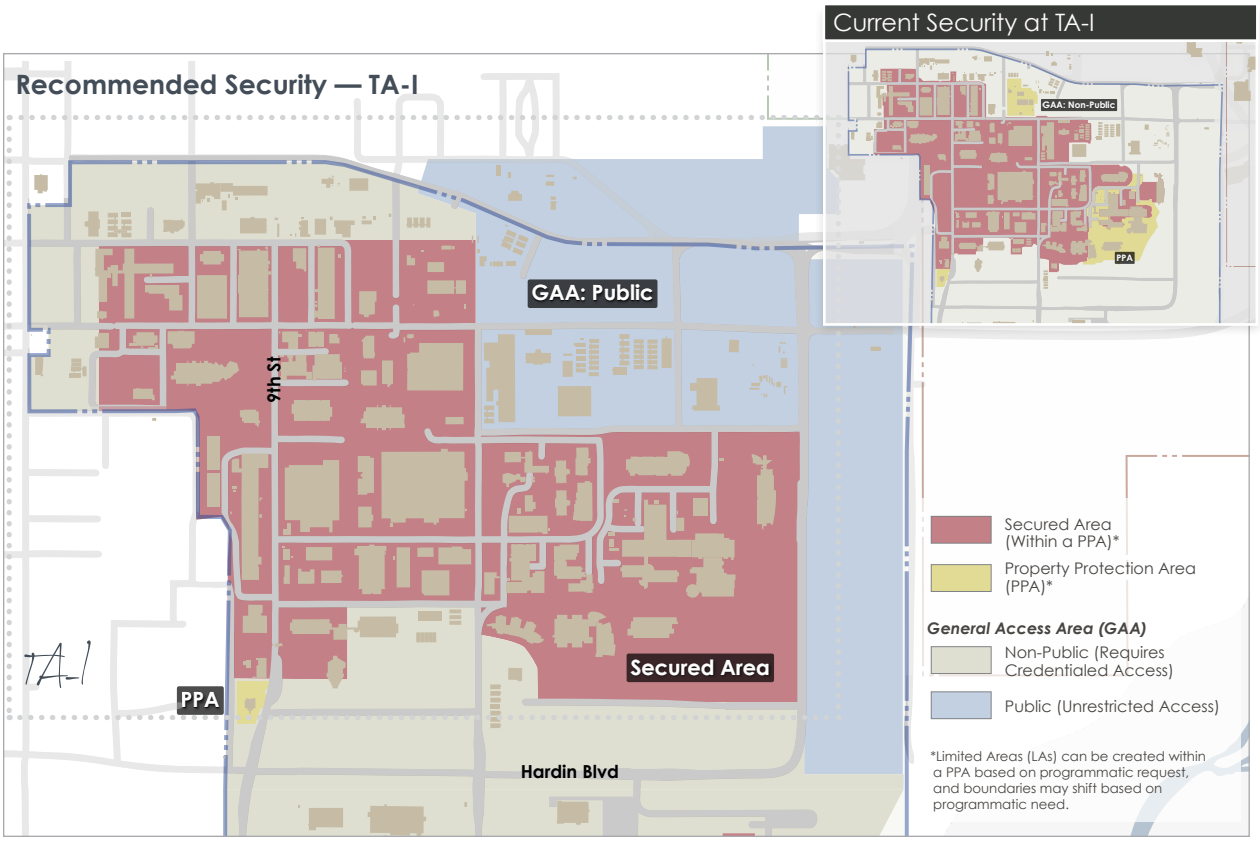
- Continue to enhance existing pedestrian corridors and complete any gaps in the system
- A primary gap is the extension of the 14th Street pedestrian corridor southward to link TA-I to TA-II and TA-IV
- Explore the opportunity to create a campus commons on the northeast corner of TA-I as this area redevelops to accommodate consolidating mission headquarters, administration and employee support service
- Promote opportunities to use the spaces between buildings as informal open spaces



Security

Reshape the site security framework to enhance the security hierarchy, make it simpler, and open portions of the site for external collaboration.

- Create a public General Access Area (GAA) on the northeast portion of TA-I (that could rapidly be sealed off in the event of an emergency) that permits unrestricted access to the outside world in order to provide opportunities to attract investment and foster research collaboration
- Establish secured areas within a Property Protection Area (PPA) to enforce maximum levels of access restriction at the building envelope level and at the site level, as required by the type of work conducted



A General Access Area (GAA) accessible to all personnel, including the public during operational hours

A Property Protection Area (PPA) that protects U.S. government-owned property against damage, destruction, or theft — access to this area requires proper credentials

Limited Areas with highest level of security enforcement

Key Source Documents for this Sub-Area Plan

- Site Development Plan – Technical Area I Focus, September 2010
- Sandia National Laboratories Campus Commons, October 1, 2011
- Operational Area Environmental Evaluations (OAEE), September 2011
- SNL Long–Range Development Framework, 2010, 2015

Environmentally Sensitive Areas

Carefully consider environmentally sensitive areas during development activities.

- The Operational Area Environmental Evaluation (OAEE) identifies the environmental sensitivity of an area to help inform management decisions about where development may be subject to additional requirements.
- The OAEE identifies potential habitat areas which should be given consideration during site selection and development.
- The OAEE advises to consult subject area experts prior to development activities that may affect sensitive areas

Currently Contemplated Investments

The TA-I Sub-Area Plan implementation requires a balanced, realistic strategy that combines long-term financial investment with supporting corporate actions that address institutional and cultural constraints.

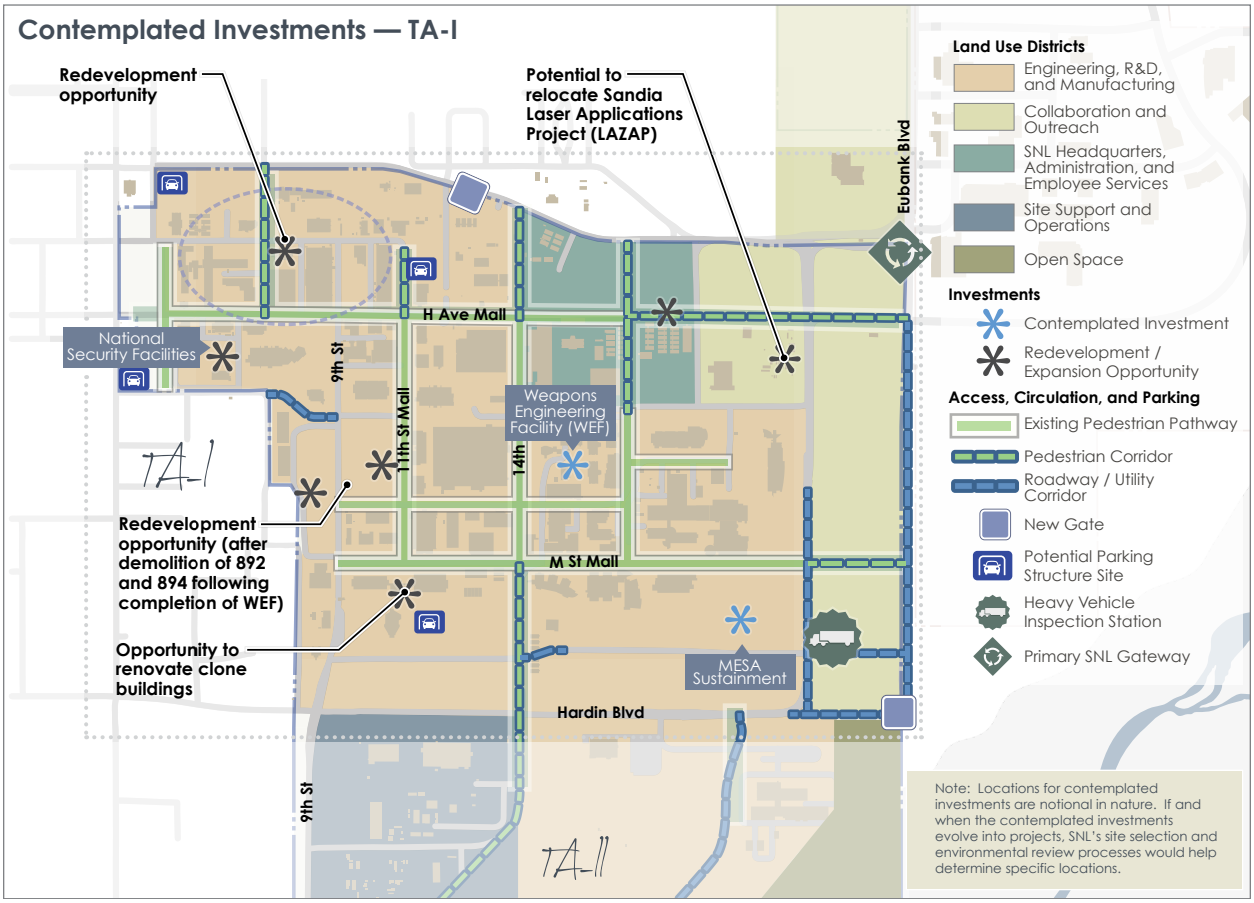
Contemplated investments include:

Potential site investments

- Construct new gates and associated physical security improvements
- Continue pedestrian corridor improvements
- Relocate Laser Applications Facility (LAZAP)

Potential facility investments

- Construct the Weapons Engineering Facility (WEF). Linked investments include demolishing 892 and 894, and repurposing 836.
- Invest in MESA sustainment
- Redevelop the northeast quadrant of TA-I for administration and mission support consolidation and collaborative purposes. A linked investment is to repurpose 802.
- Construct facilities for National Security program
- Renovate "clone" facilities (890, 891, 821, 823)




Sandia National Laboratories

TA-II

Sub-Area Plan
Overview & Summary

SNL/NM Technical Area II

A Component of Sandia National Laboratories'
Long-Range Development Framework

Developed: 2009
Refreshed: 2015

Sandia National Laboratories

National Nuclear Security Administration

SNL TA-II resides in a dry brownfield region, in the "backyard" of SNL/NM.

Key Features of the TA-II Sub-Area Plan

Technical Area II is a brownfield site with a central, but "backyard" location that makes it a perfect area for site-support activities, particularly those that can be relocated from the TA-I "front-yard." TA-II has a large amount of undeveloped land that should be held in reserve for future R&D mission work. Specifically, the Sub-Area Plan recommends:

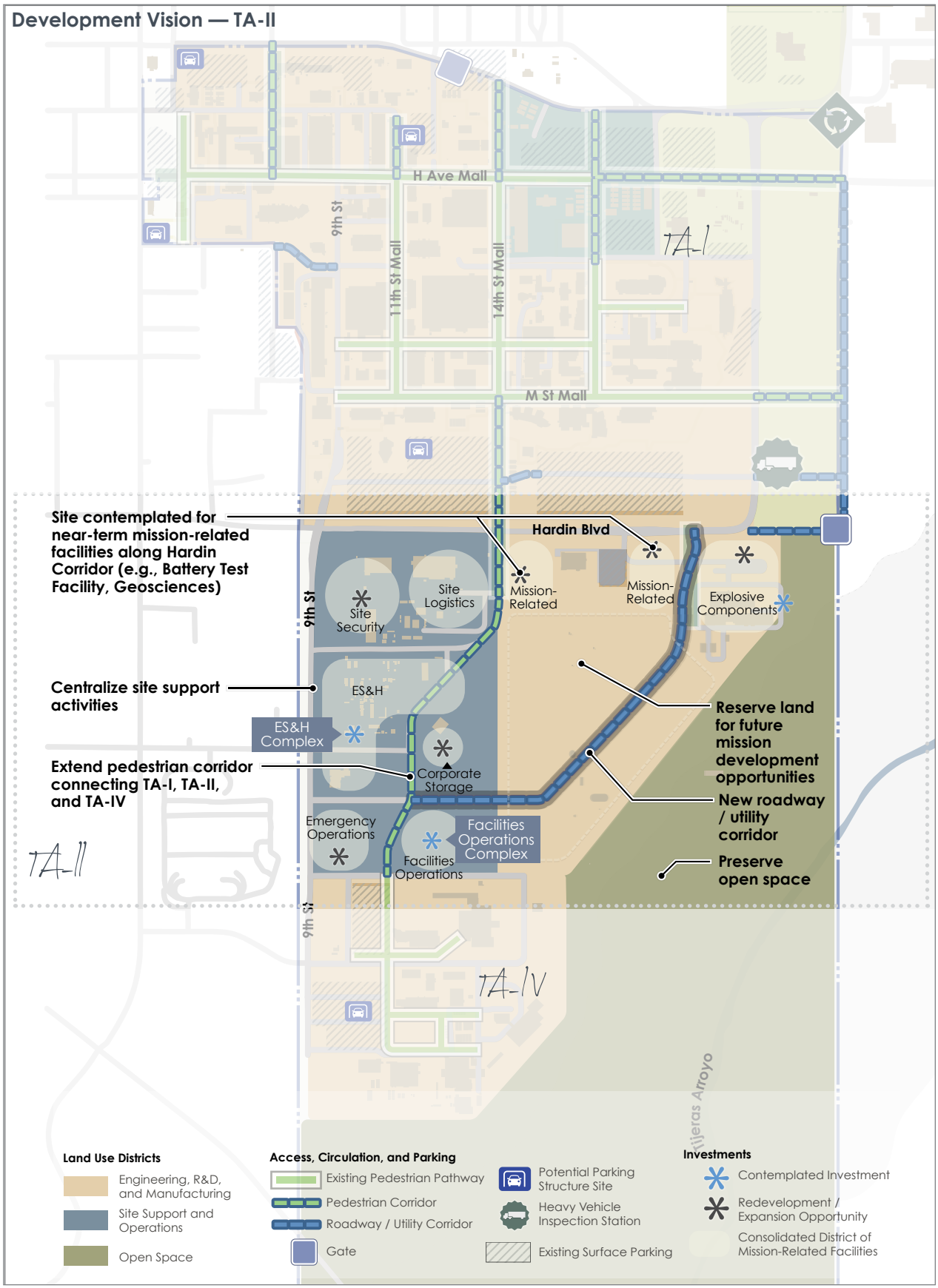
- Accommodating primarily site-support land uses, including site-support functions that can be relocated from TA-I
- Preserving land for future mission development opportunities which also protects sensitive environmental areas
- Locating future development along the Hardin and 9th Avenue corridors where existing infrastructure exists
- Constructing critical infrastructure links (e.g., roads and utilities)

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

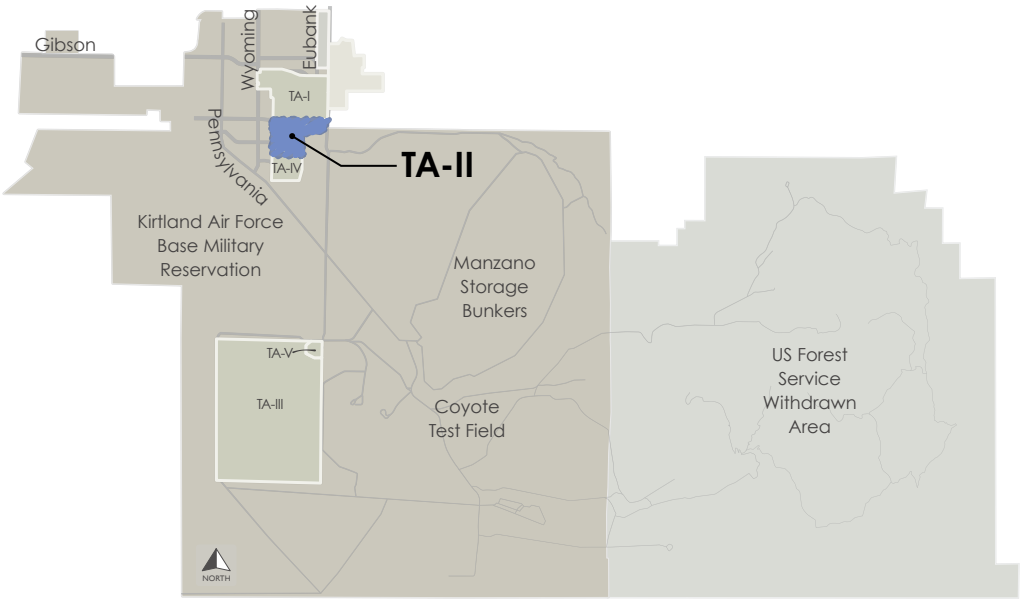
SAND Number: SAND2016-2396 R

Development Vision — TA-II



Location

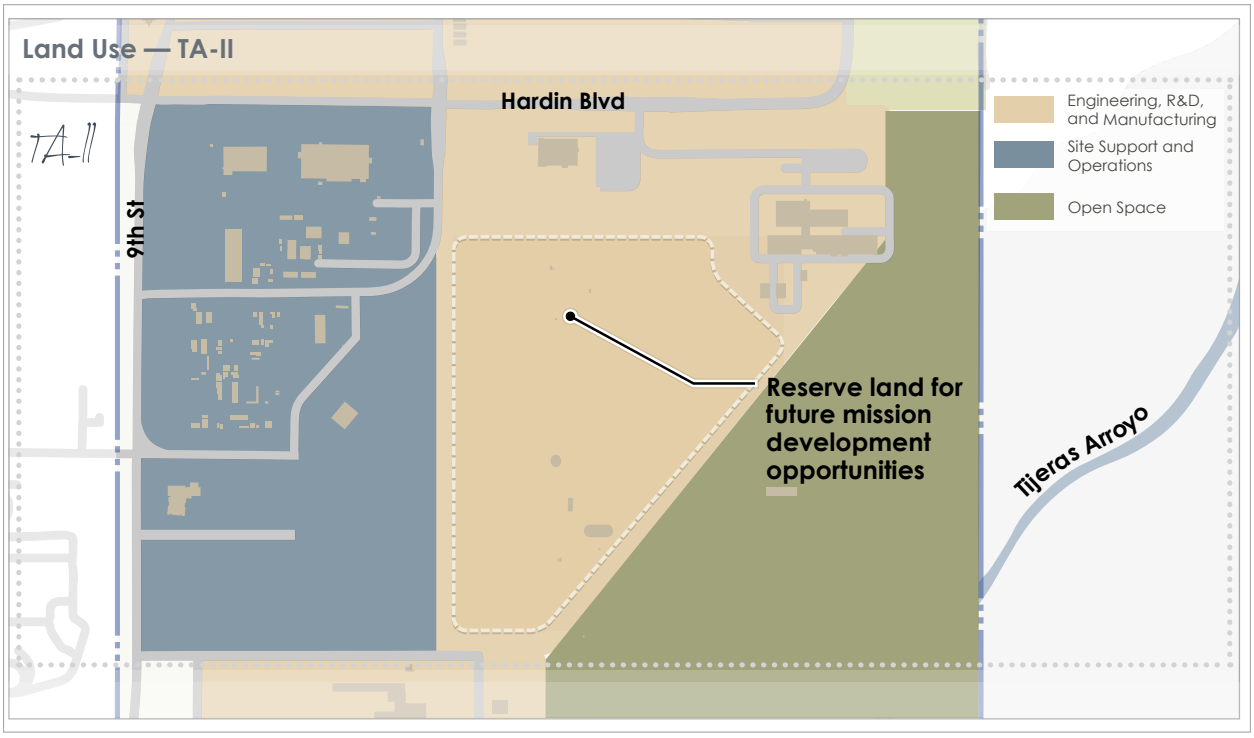
TA-II resides between TA-I and TA-IV on a developable brownfield site.



Future Land Use

Maintain and consolidate current Site Support and Engineering, Research and Development (R&D), and Manufacturing land uses and reserve land for future mission development opportunities.

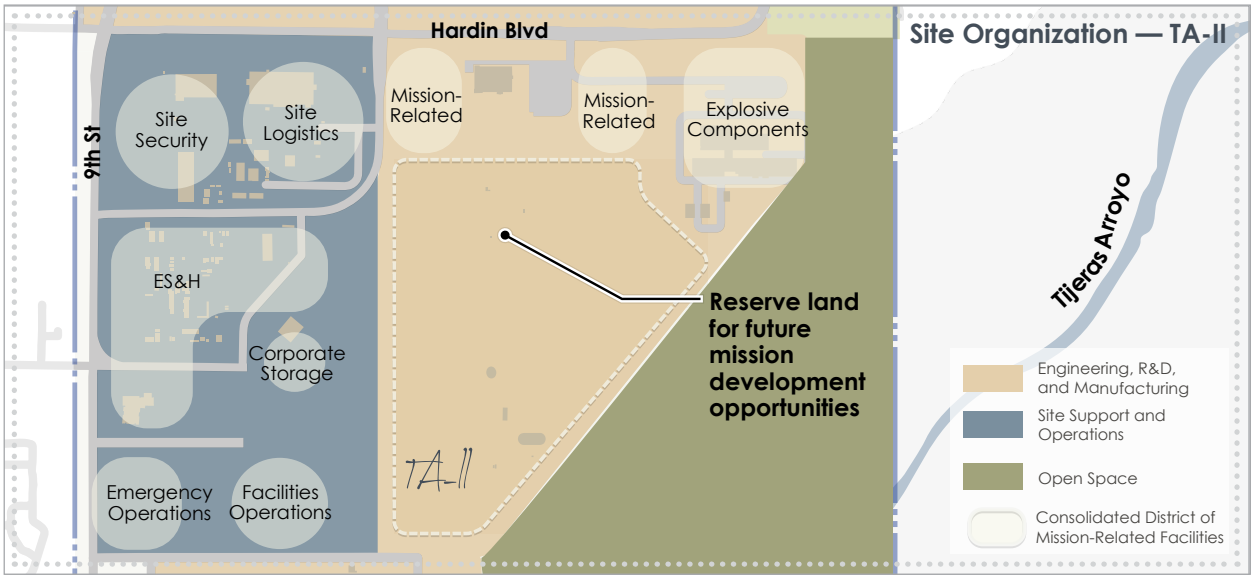
- Future TA-II land uses will be primarily a combination of Site Support and Engineering, R&D, and Manufacturing
- Future land uses reflect continuing and consolidating current uses, and some redevelopment, and include:
  - Locating site-support activities and functions along the 9th Street corridor
  - Relocating the hazardous waste storage currently within TA-II to a consolidated site at the Radioactive and Mixed Waste Management Facility (RMWMF), based upon endorsement of recommendations contained in the September 30, 2003 Consolidated Waste Management Facility Study
  - Holding in reserve about 75 acres of land for future mission development opportunities on the Hardin Boulevard corridor extending south to TA-IV
  - Preserving for the long term current open space above and northwest of the Tijeras Arroyo



Site Organization

Create functionally related development districts.

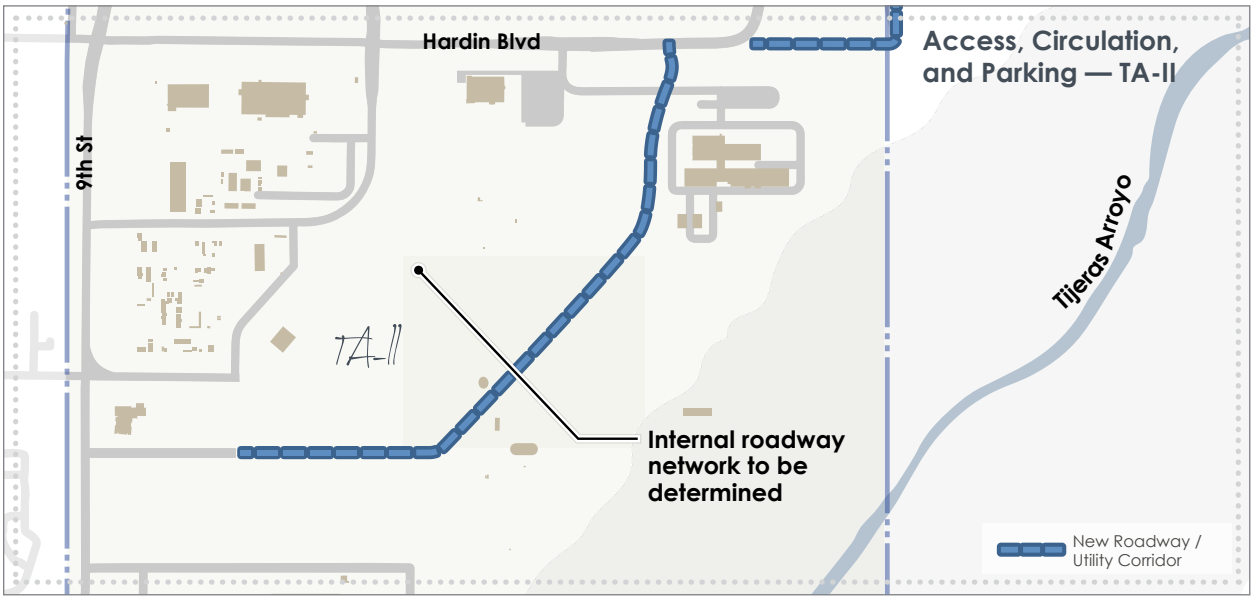
- The TA-II Sub-Area Plan envisions a variety of "districts" along the 9th Street corridor that cluster related site-support activities that capitalize on existing infrastructure, facilities, and provide numerous siting opportunities for new facilities
- Other districts along Hardin Boulevard accommodate existing and new mission-related facilities



Access, Circulation, and Parking

Implement critical infrastructure links.

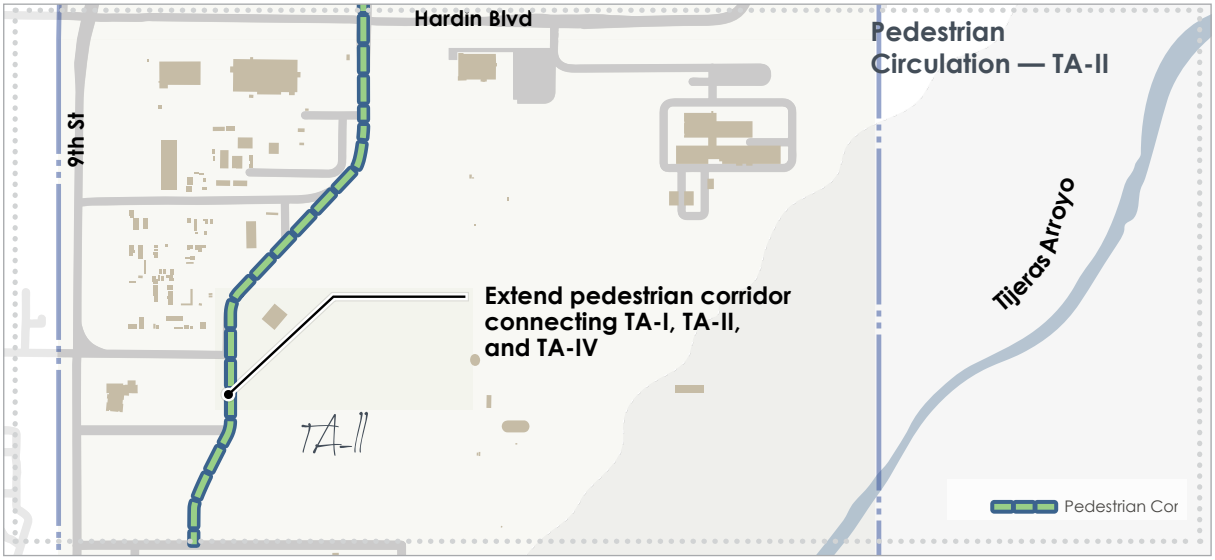
- The TA-II Sub-Area Plan incorporates the 2005 Environmental Test Capabilities Infrastructure Master Plan recommendation to extend a road and utility corridor connecting Hardin Boulevard to 9th Street



Pedestrian Circulation and Outdoor Areas

Extend 14th Street multi-modal corridor to TA-II and enhance the Tijeras Arroyo escarpment for wildlife habitat protection and recreational trails.

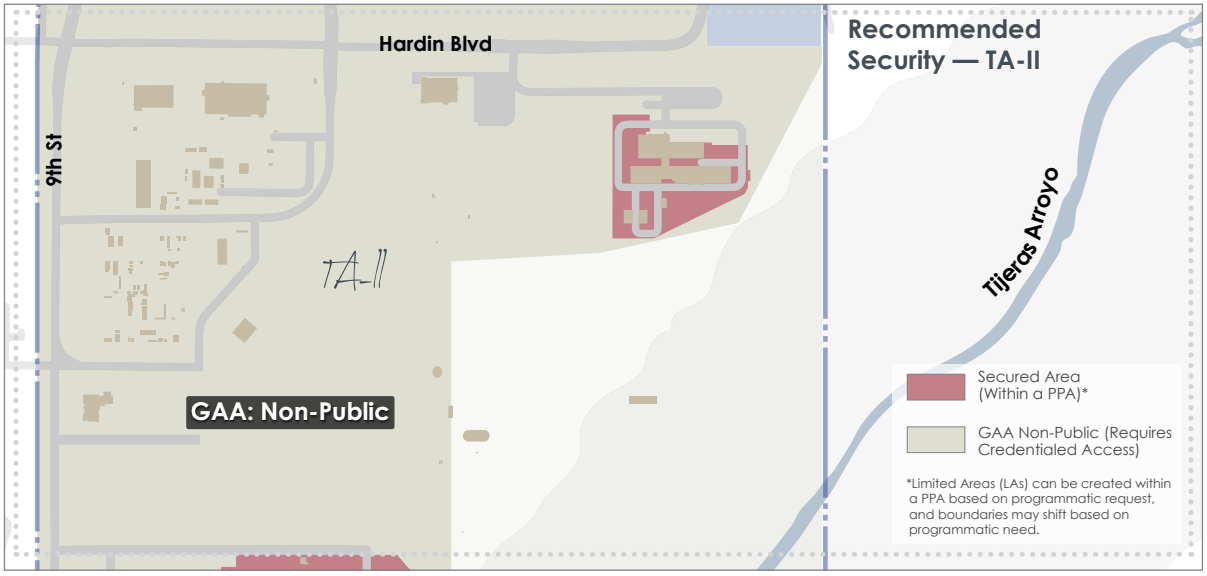
- Extend the 14th Street multi-modal corridor from TA-1 to TA-IV, providing a connection between the two major employment concentrations
- Tijeras Arroyo escarpment provides an opportunity to enhance wildlife habitat and to construct recreational trails



Security

TA-II requires no security changes.

- TA-II is a Non-Public General Access Area (GAA) security zone with some stand-alone secured areas within a Property Protection Area (PPA)

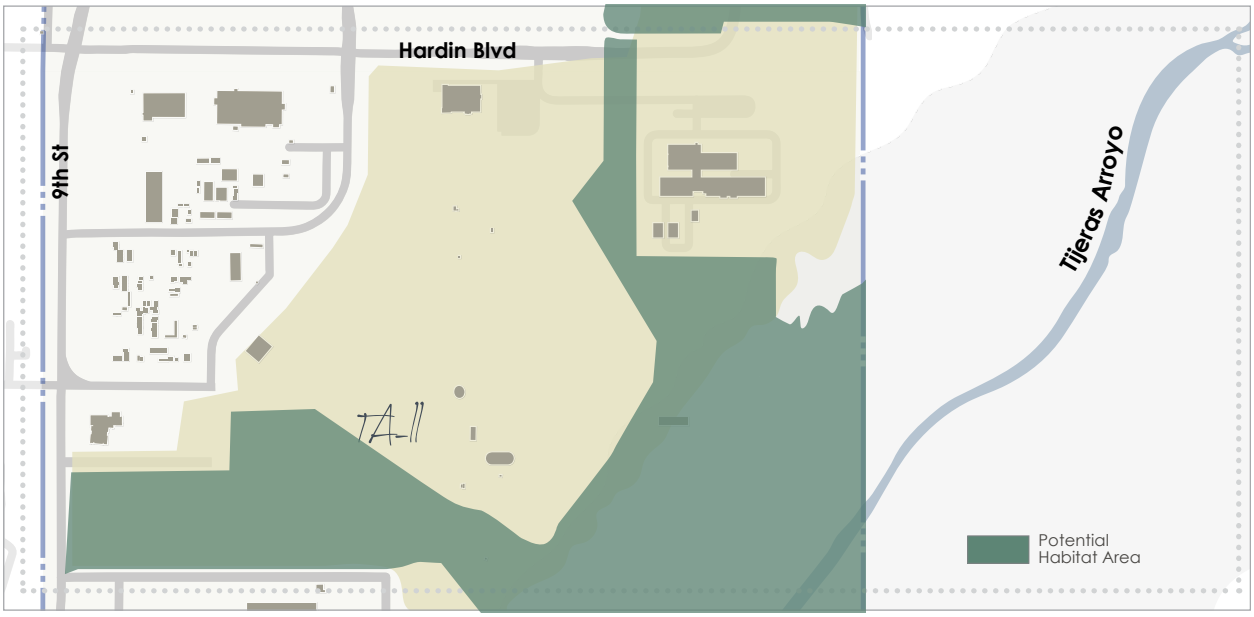


Environmentally Sensitive Areas

Consider environmentally sensitive areas that may affect siting and design of individual projects.

- The Operational Area Environmental Evaluation (OAEE) identifies the environmental sensitivity of an area to help inform management decisions about where development may be subject to additional requirements.
- The OAEE identifies potential habitat areas which should be given consideration during site selection and development.
- The OAEE advises to consult subject area experts prior to development activities that may affect sensitive areas

Sensitive Areas — TA-II

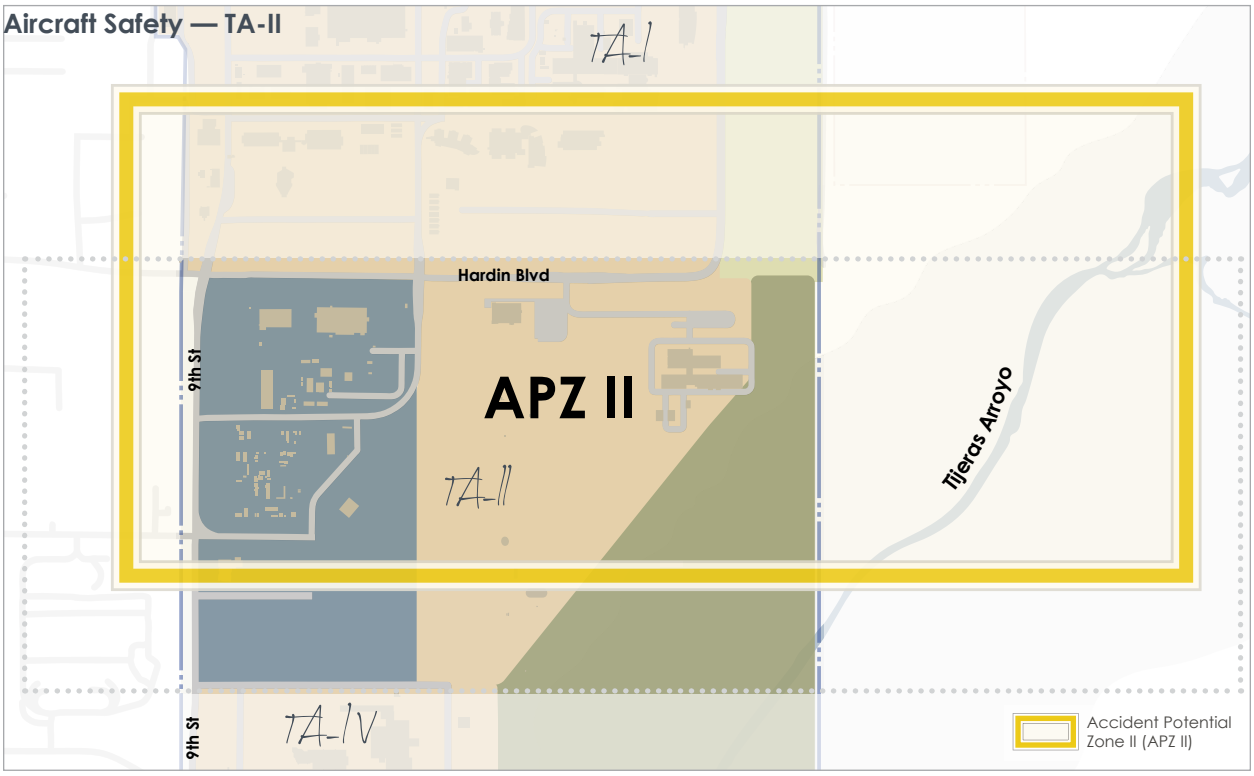


Aircraft Safety

Recommended land uses are compatible with designated aircraft accident potential zones.

- Most of TA-II lies under airplane flight paths associated with nearby Kirtland Air Force Base (KAFB) and Albuquerque International Sunport
- The Air Force designates certain zones to identify where the risk of aircraft accidents justifies special land use restrictions
- TA-II falls within Accidental Potential Zone II (APZ II) — the zone with the least hazard potential
- TA-II's anticipated land uses are compatible with Air Force recommendations

Air Force guidance considers high-density functions such as multi-story buildings, places of assembly, and high-density office uses to be appropriate within an APZ II zone



Source: Kirtland AFB Joint Land Use Study, 6/2010

Currently Contemplated Investments

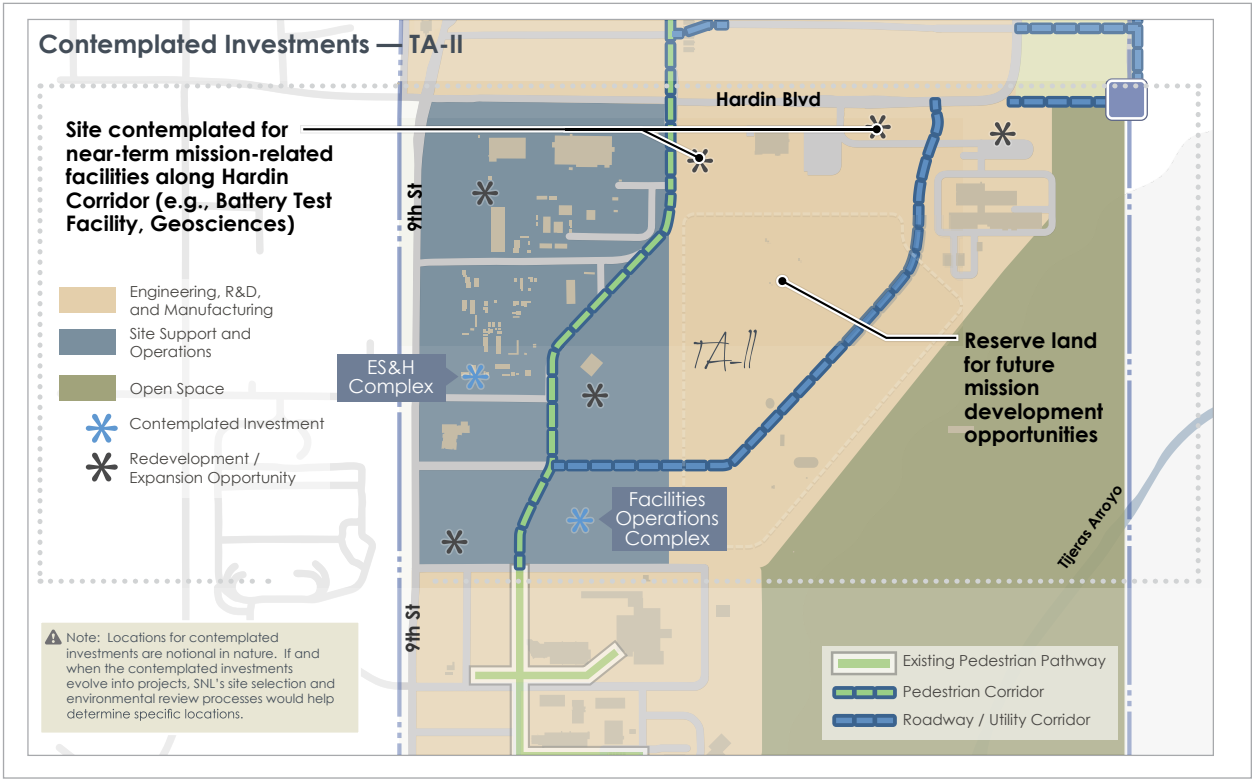
Make site investments to enable the area to accommodate future development. Relocate site-support functions and address specific mission-oriented needs.

Potential Site Investments

- Focus site investments to enable the area to accommodate further development
- Construct missing roadway connections
- Further extend the utility infrastructure within the core of the Sub-Area
- Invest in landscaping and screening improvements along 9th Street as consolidated mission support complexes are developed

Potential Facility Investments

- Site support
  - Consolidated Environment, Safety and Health (ES&H) Complex
  - Corporate Site Storage
  - Consolidated Facilities and Operations Center
  - Emergency Operations Response Center
  - Consolidated Security Complex
- Mission-oriented
  - Battery Test Facility
  - Geosciences facility



📖 Key Source Documents for this Sub-Area Plan

- TA-II Sub-Area Plan, 2009
- Division 4000 Facilities and Infrastructure Plan, January 2014
- Emerging Technical Center (ETC) Infrastructure Master Plan Study, September 2005
- Consolidated Waste Management Facility Study, September 2003
- Operational Area Environmental Evaluations (OAEE), September 2011
- SNL Long–Range Development Framework, 2010; 2015


Sandia National Laboratories

TA-IV

Sub-Area Plan
Overview & Summary

SNL/NM Technical Area IV

A Component of Sandia National Laboratories'
Long-Range Development Framework

Developed: *2013*
Refreshed: *2015*

Sandia National Laboratories

National Nuclear Security Administration

SNL/NM TA-IV vicinity

Key Features of the TA-IV Sub-Area Plan

The Plan seeks to:

- Sustain programs and activities, and safeguard opportunities to grow mission through redevelopment and infill
- Maintain existing land use designations
- Construct a multi-modal corridor that connects TA-I, TA-II, and TA-IV
- Implement minor adjustments to the site's security boundaries
- Implement an incremental development strategy that enhances the many positive features of the area
- Replace temporary buildings with permanent (GPP-size) structures

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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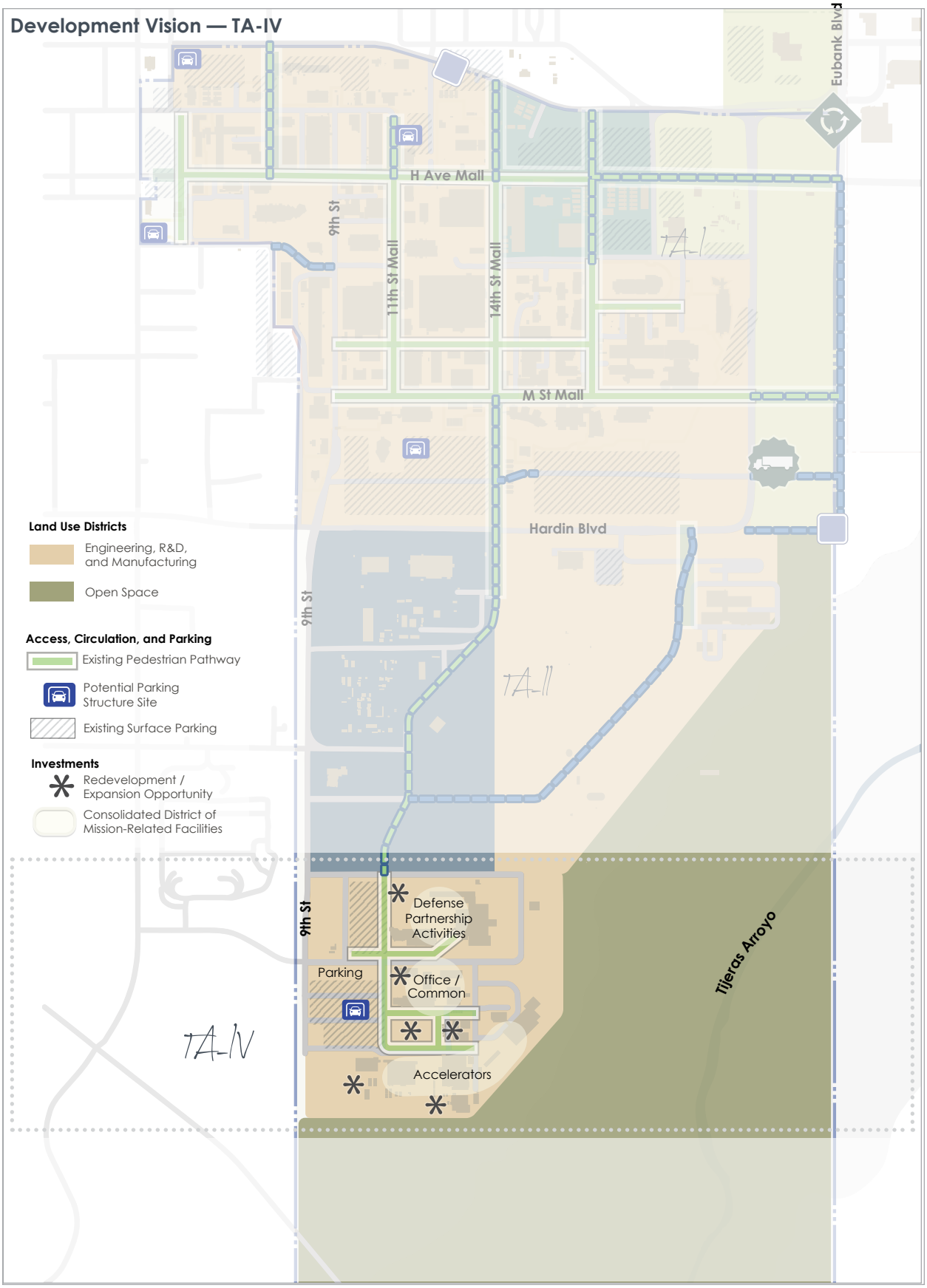
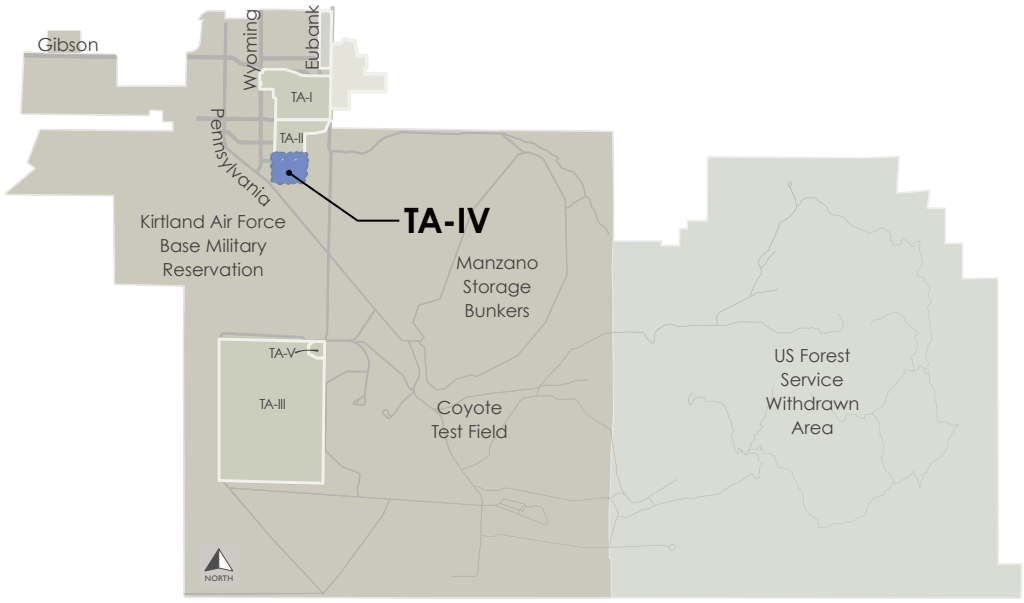
SAND Number: SAND2016-2398 R

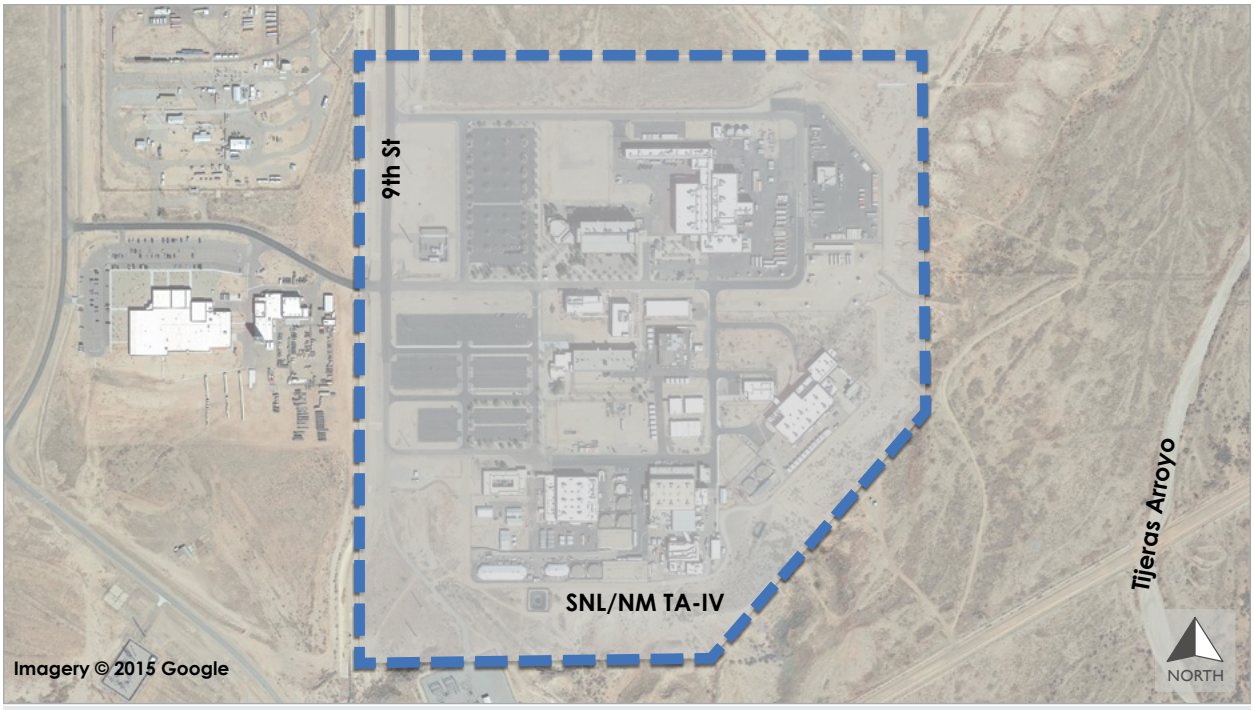
Development Vision — TA-IV



Location

TA-IV is located directly south of TA-II.



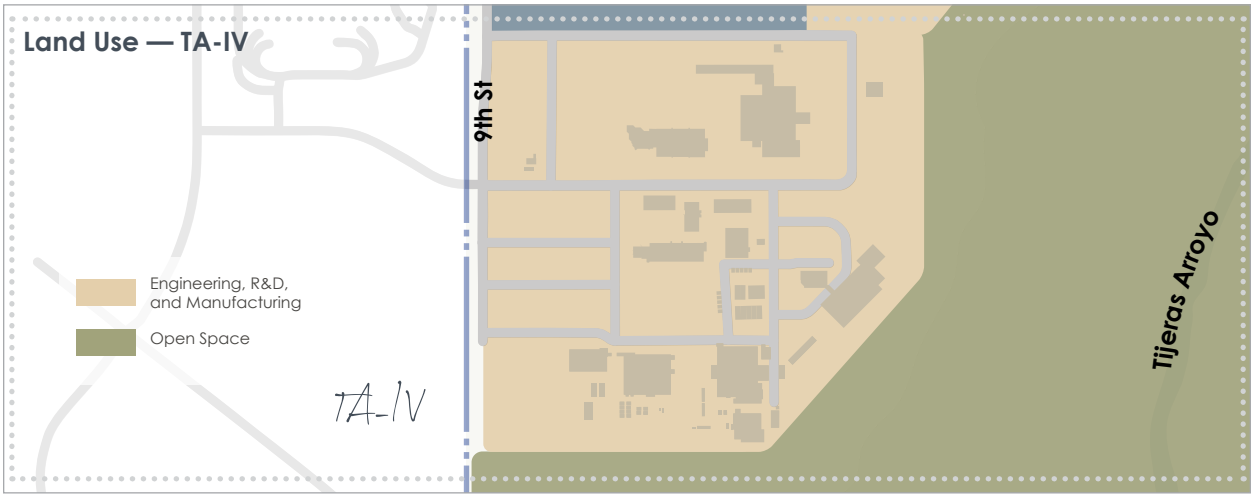


Approximate boundary of SNL/NM TA-IV

Future Land Use

Maintain current land uses.

- Current land use within TA-IV reflects a mix of laboratory and office facilities for scientific research and testing, as well as designated open space in the adjacent Tijeras Arroyo
- Planning foresees no major changes to the current land uses

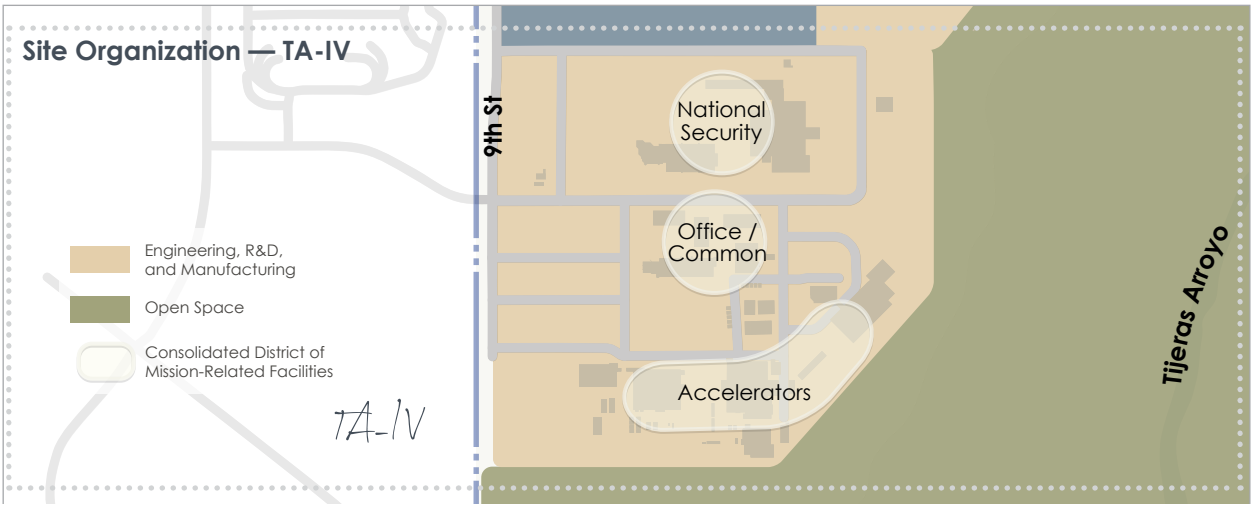


Site Organization

Maintain existing site organization to reflect accelerator and national security mission-related facility and security needs.

- Accommodate Accelerator and National Security programs and activities
- Reinforce a common entry point
- Provide shared office and employee support facilities

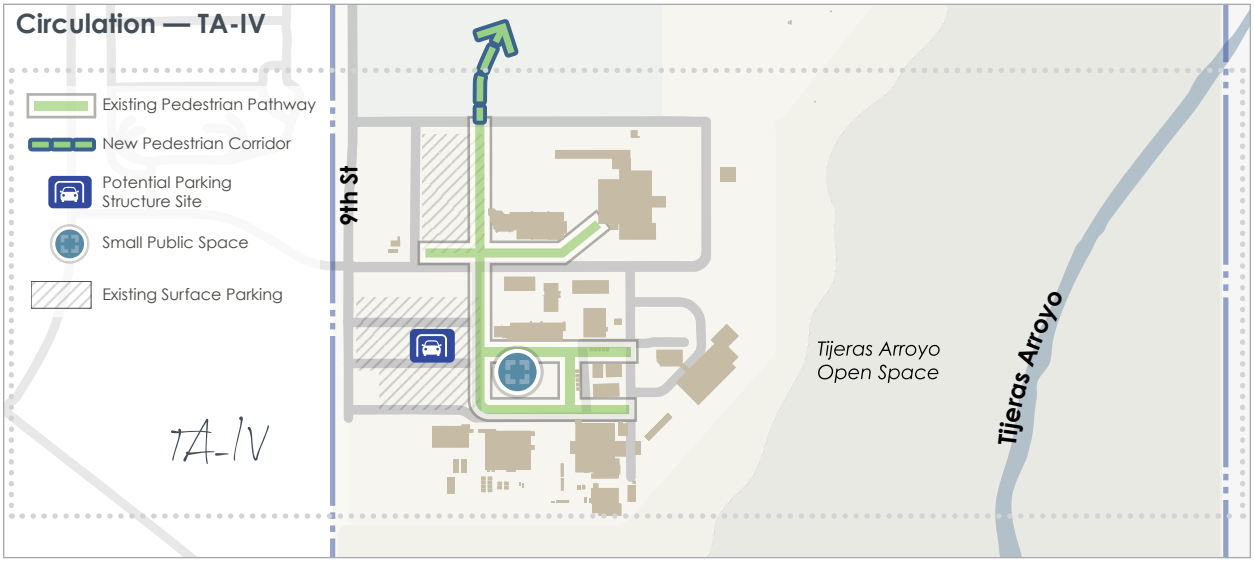
- Maintain flexibility with security boundaries



Vehicular and Pedestrian Circulation

Connect 14th Street multi-modal corridor from TA-I through TA-II, to TA-IV.

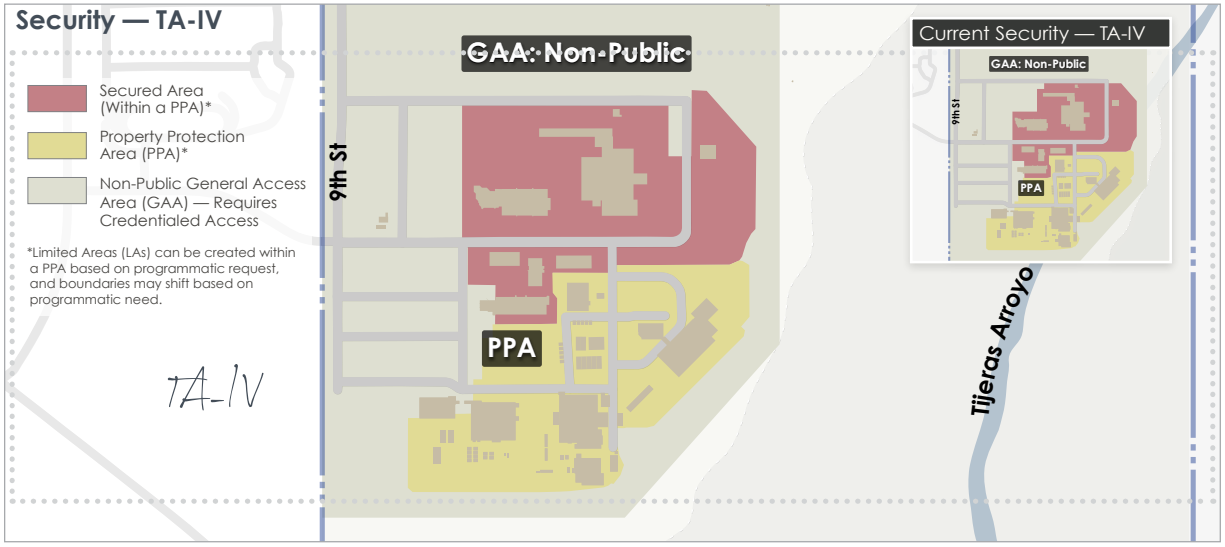
- Extend 14th Street multi-modal corridor to TA-IV from TA-I
- Enhance existing pedestrian walkways and public spaces in TA-IV
- Improve existing parking lots
- Construct a parking garage, if warranted in the long term



Security

Make minor adjustments to the existing security framework.

- Make the security zones logical and user-friendly as new development or redevelopment occurs within TA-IV in the future
- Minimize the movement of personnel through a fluctuating security perimeter and avoid islands of different security or access control



Environmentally Sensitive Areas

Avoid development that affects the adjacent Tijeras Arroyo corridor if possible.

- The Operational Area Environmental Evaluation (OAEE) identifies the environmental sensitivity of an area to help inform management decisions about where development may be subject to additional requirements.
- The OAEE identifies potential habitat areas which should be given consideration during site selection and development.
- The OAEE advises to consult subject area experts prior to development activities that may affect sensitive areas
- The Department of Energy has a memorandum of agreement with Kirtland Air Force Base, and the City of Albuquerque to preserve the Tijeras Arroyo as a wildlife corridor.

Currently Contemplated Investments

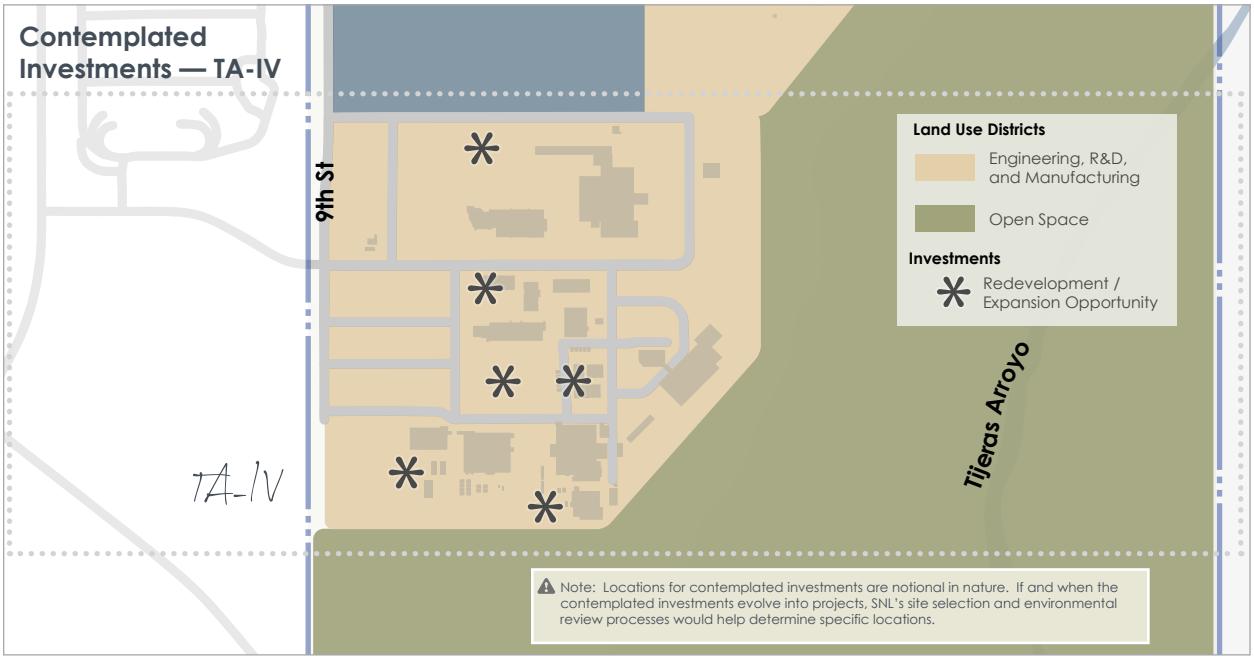
Implement an incremental development strategy that enhances the many positive features of the area.

Potential Site Investments

- Update current screening and fencing to reinforce area identity
- Clearly designate all building entrances using signage, canopies and other design elements
- Provide clear and consistent wayfinding and building signage
- Provide clearly designated pedestrian paths separated from major vehicular routes and new security gates integrating proper signage and color
- Construct infrastructure projects to support reactors and accelerators

Potential Facility Investments

- Building 986 addition
- TA-IV "Z" support building
- Next generation Z Machine
- A central storage facility for all infrequently accessed materials and equipment



📖 Key Source Documents for this Sub-Area Plan

- TA-IV Sub-Area Plan, 2013
- Operational Area Environmental Evaluations (OAEE), September 2011
- SNL Long–Range Development Framework, 2010; 2015

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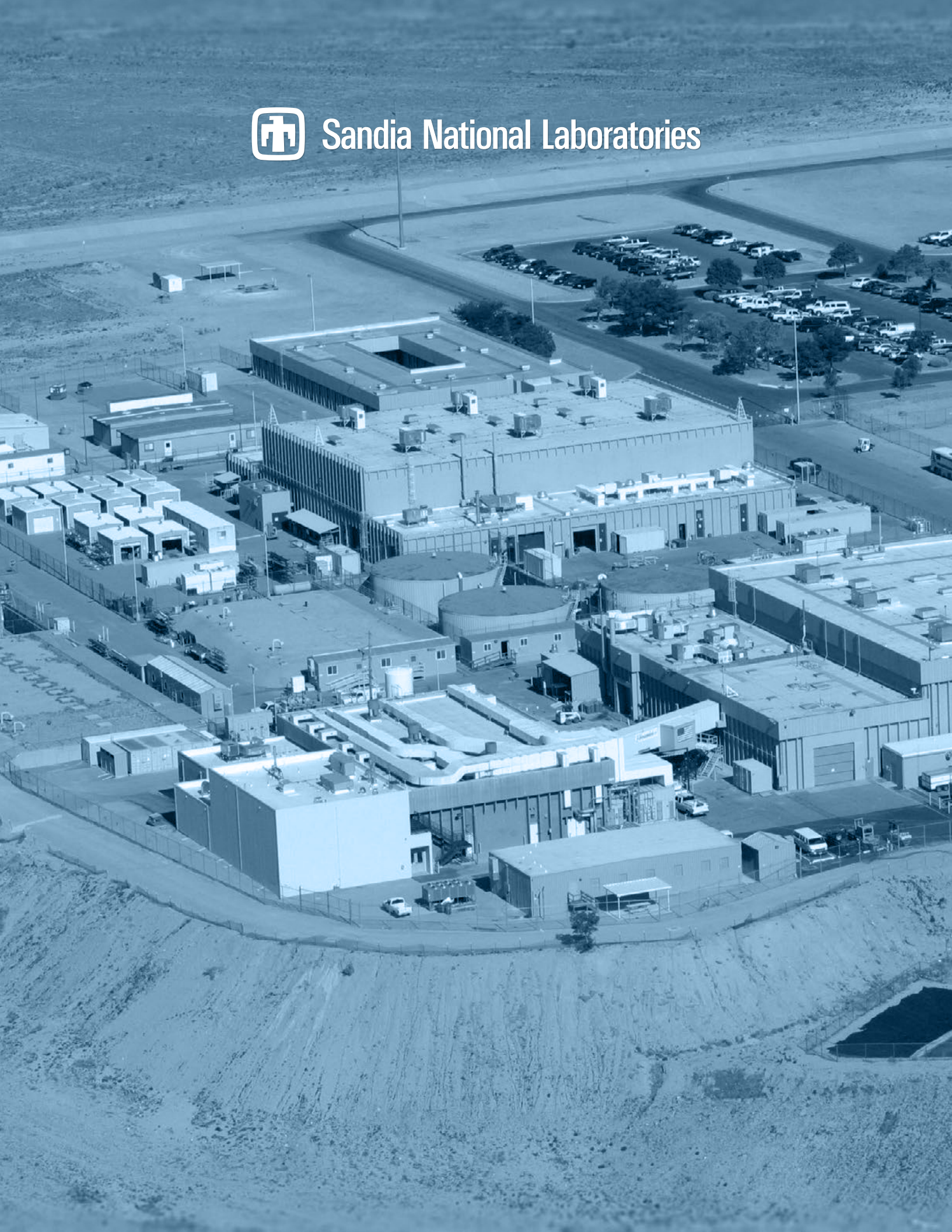
Sandia National Laboratories

CA

Sub-Area Plan
Overview & Summary

SNL/California Site

A Component of Sandia National Laboratories'
Long-Range Development Framework

Developed: *2011*
Refreshed: *2015*

Sandia National Laboratories

National Nuclear Security Administration

SNL/CA site in Livermore, California

Key Features of the SNL/California Sub-Area Plan

The Plan seeks to:

- Maintain current Research and Development (R&D), engineering, manufacturing, and administration land uses
- Create a new corporate entrance and "front door" on the east side of the campus in an expanded General Access Area
- Make security changes to expand the Limited Areas to accommodate growth in classified programs, and expand the General Access Area to promote collaboration with the private sector in concert with general Livermore Valley Open Campus (LVOC) development
- Organize and consolidate mission capability groups on campus
- Enhance the quality of the working environment through pedestrian and bicycle circulation, landscape, recreational and sustainable site design improvements

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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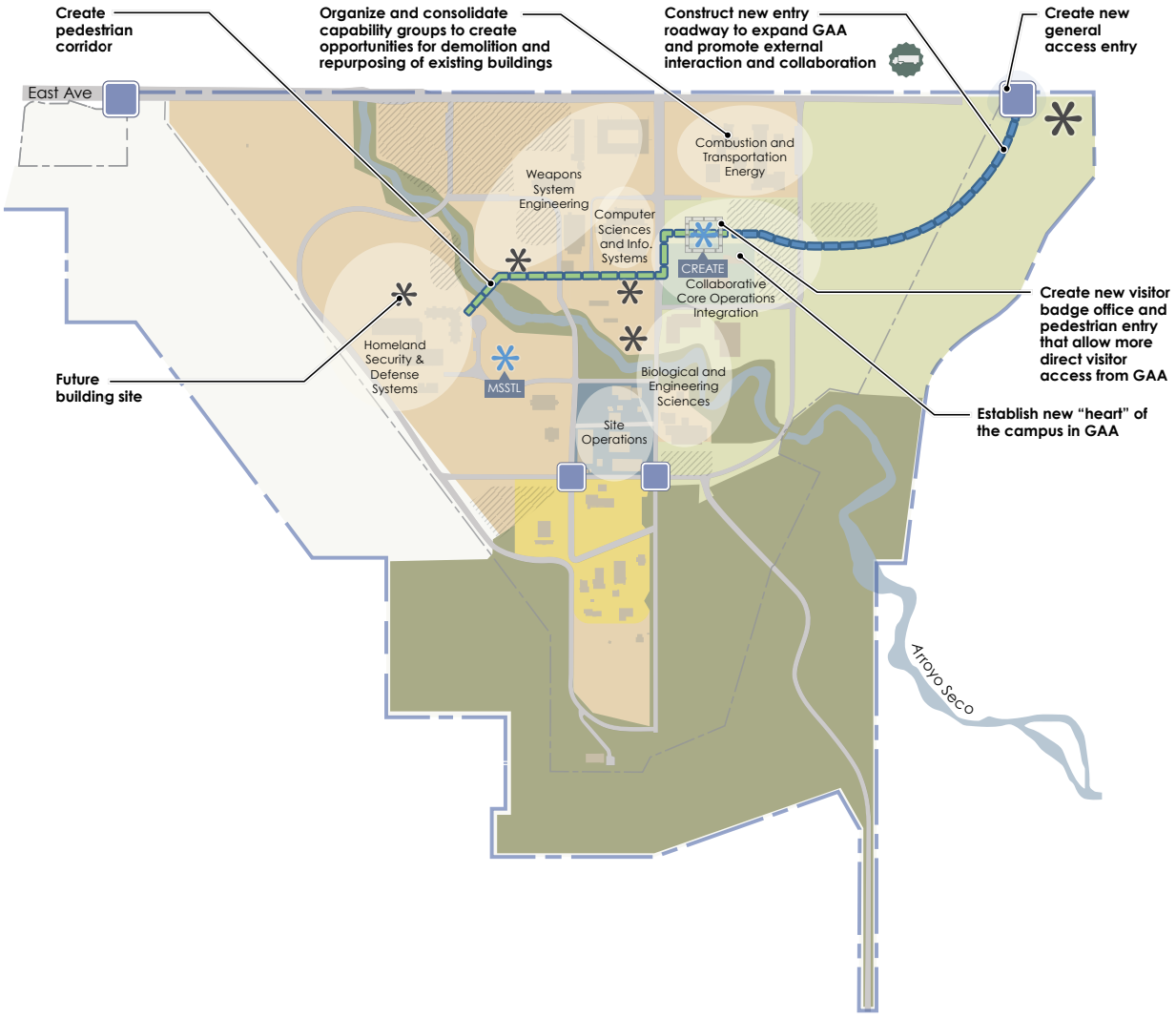
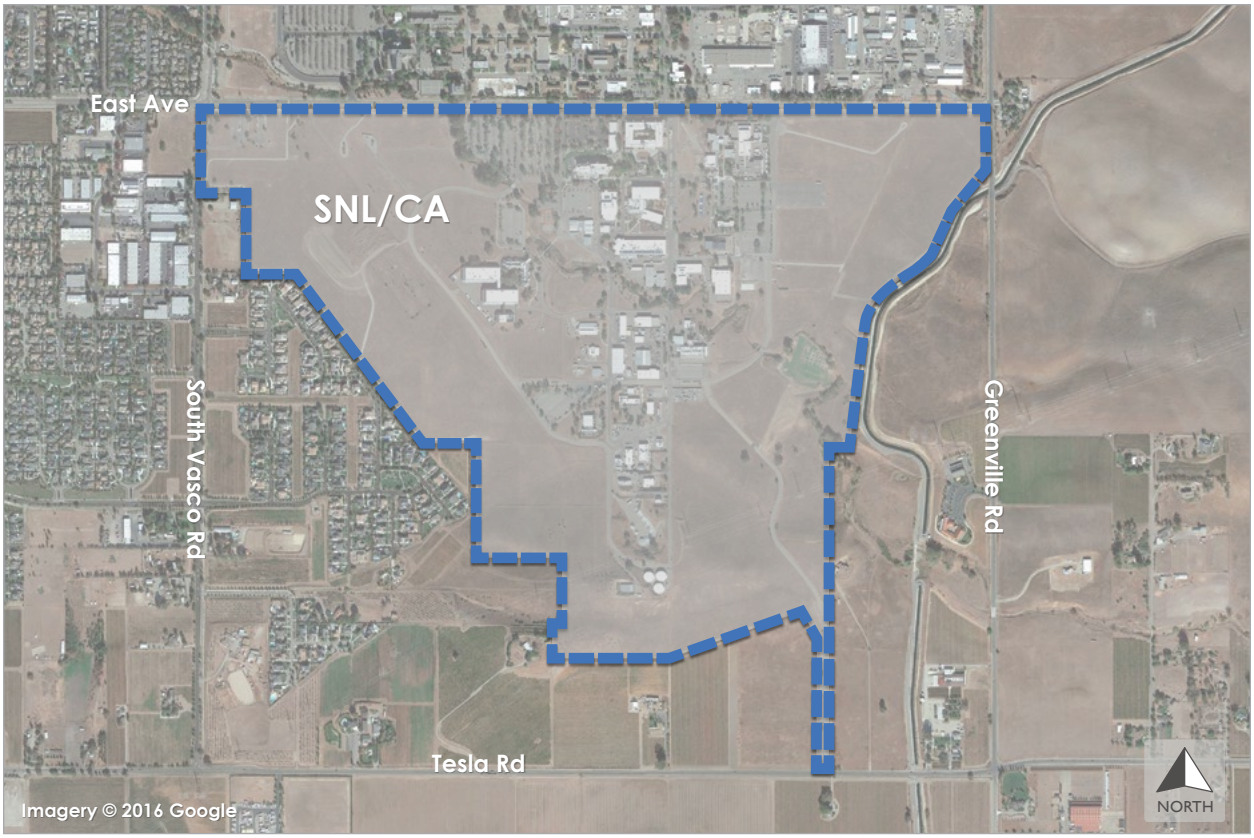
SAND Number: SAND2016-2455 R

Development Vision — SNL/CA



Location

SNL/CA is located in Livermore, California, directly south and adjacent to Lawrence Livermore National Laboratory (LLNL).



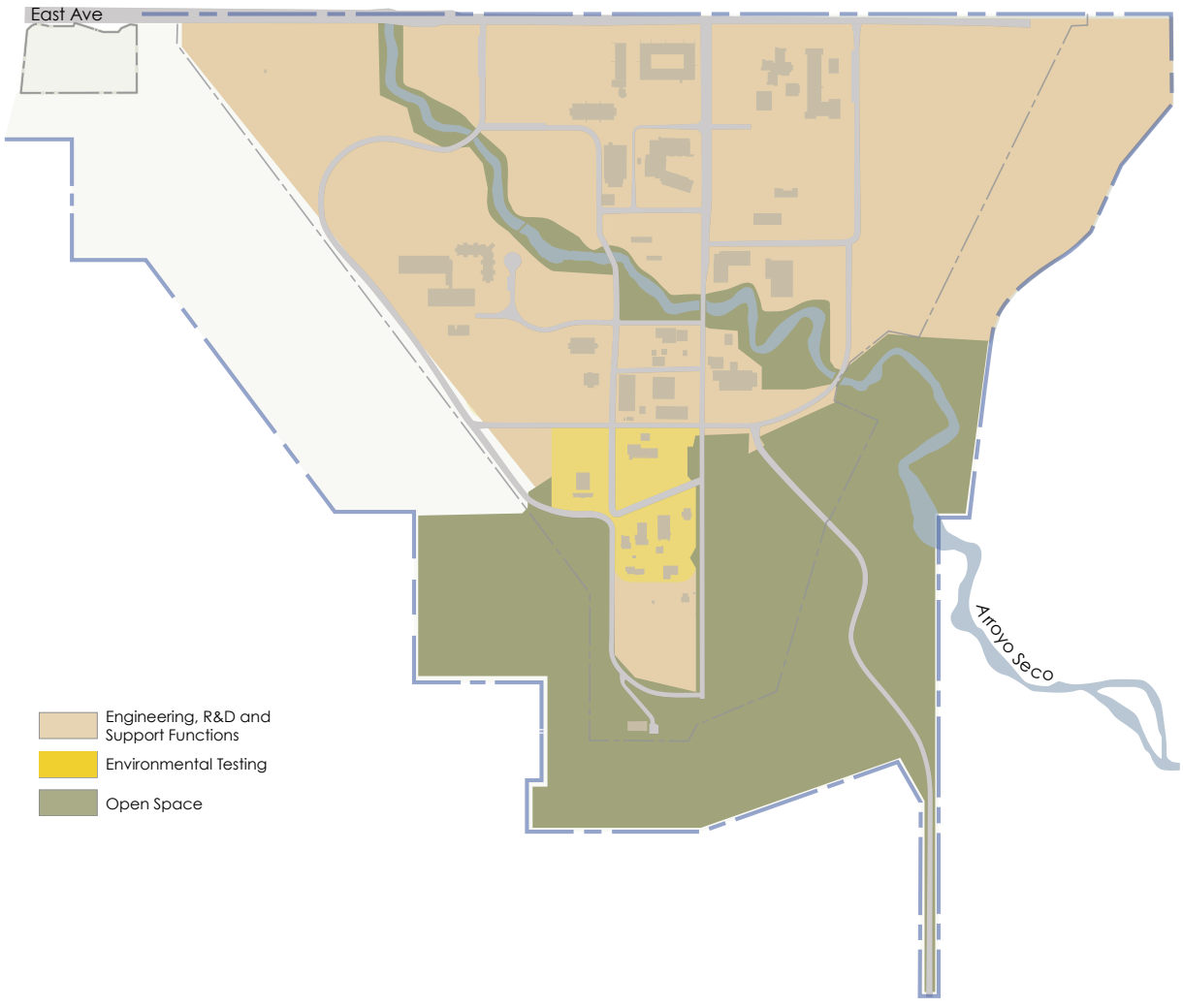
SNL/CA vicinity

Future Land Use

Adjust existing land use to accommodate an expanded emphasis on collaboration and outreach, and site sustainability.

- Future land use will largely reflect current site uses
- An expanded Collaboration and Outreach zone on the east portion of the site will support the long-range development of the Livermore Valley Open Campus (LVOC)
- Preserve and enhance open spaces for recreation and wildlife habitat protection

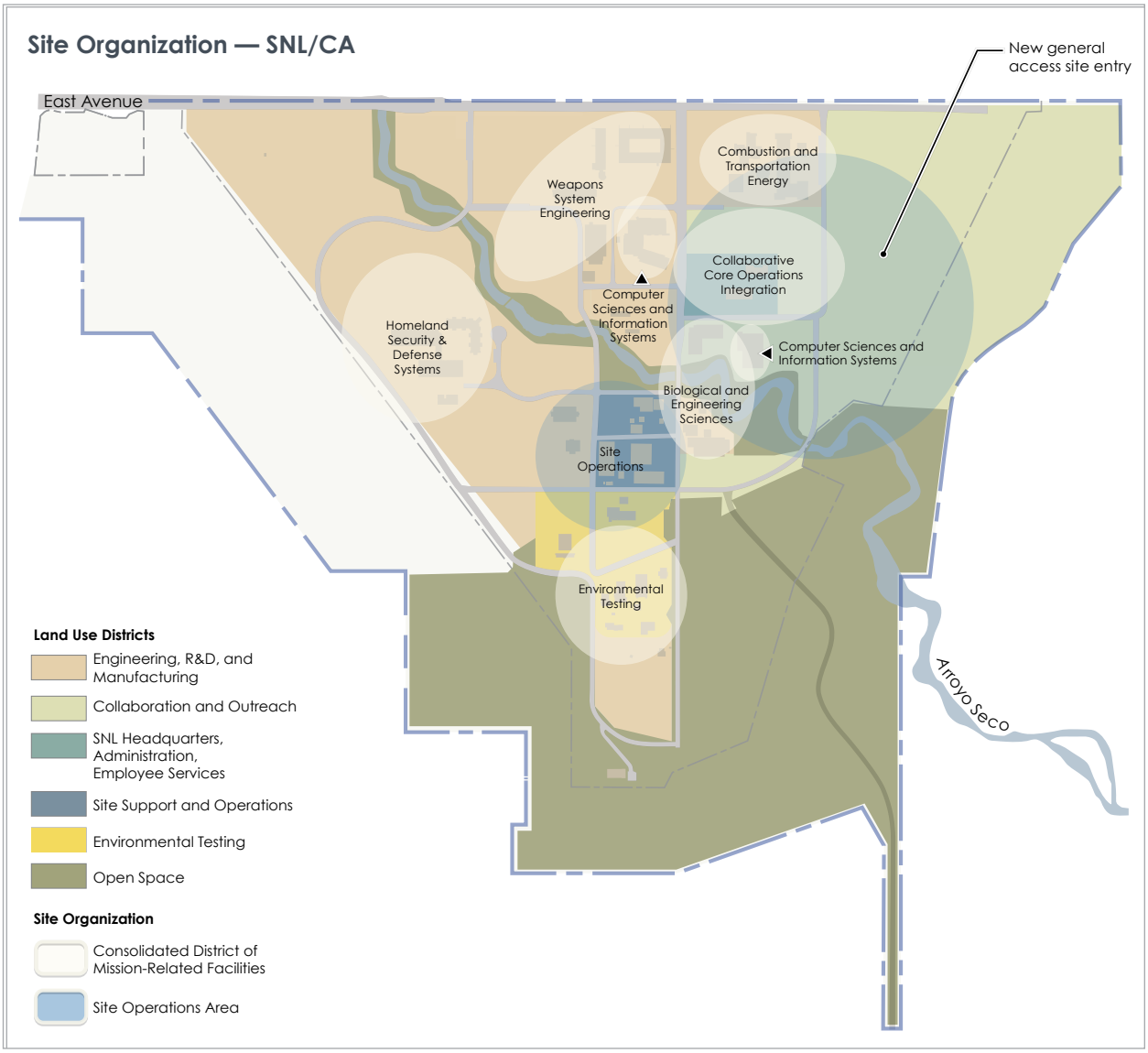
Land Use — SNL/CA



Site Organization

Organize and consolidate mission capability groups on campus to improve efficiency and create space for new functions.

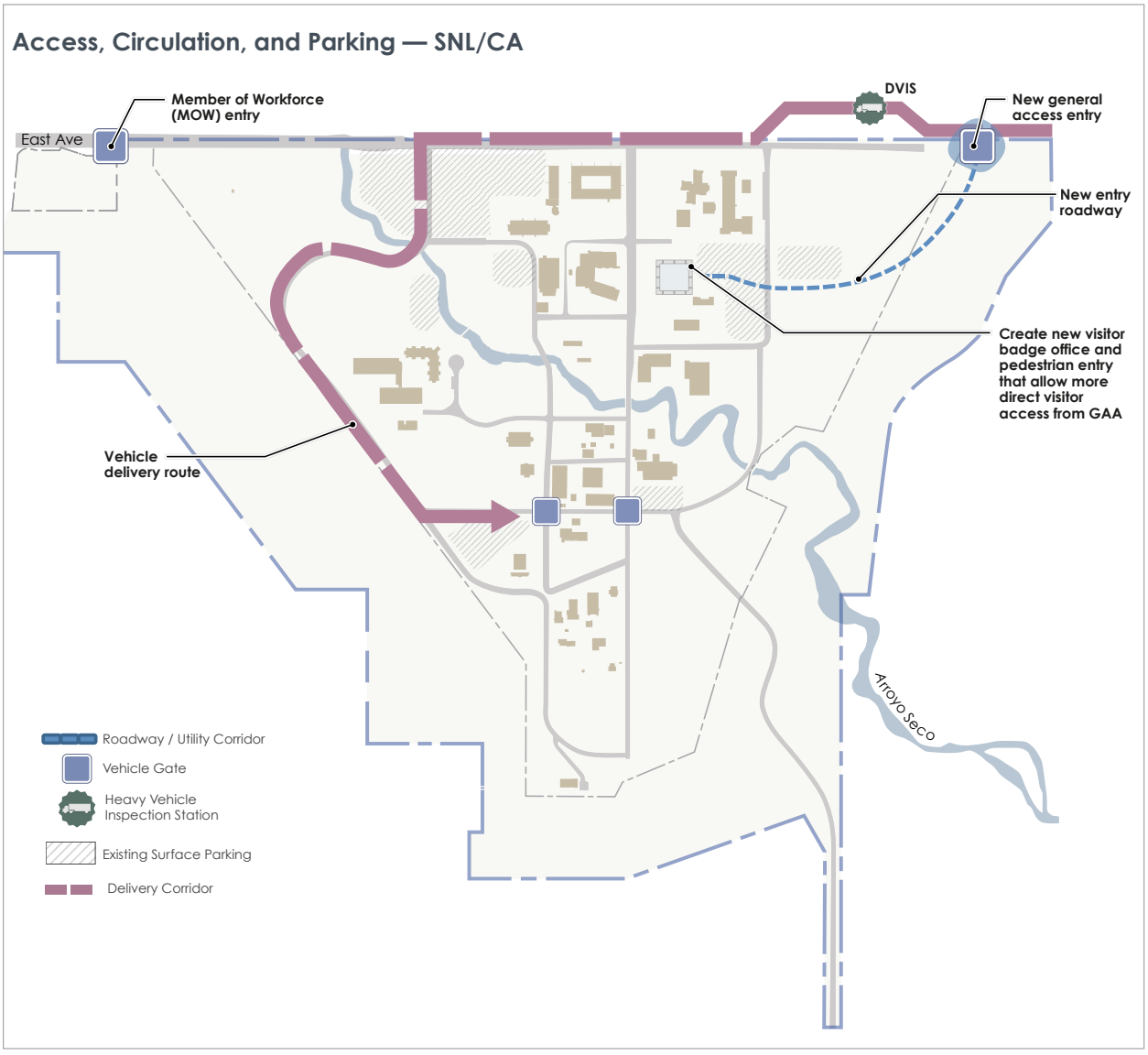
- Create a new corporate entrance on the east side of the site in concert with LVOC development
- Develop a campus "commons" with food service, human resources, the Life Design Center, library, and other employee amenities to support a social gathering space
- Centralize site-support activities
- Consolidate mission capability groups to improve functional efficiencies, but also to provide opportunities to demolish and re-purpose existing buildings to create adaptable and flexible space



Access, Circulation, and Parking

Develop a major corporate entrance.

- Create a new entry for the site that does not rely on East Avenue and that brings visitors and new employees directly to a Visitor Badge Office from which they may walk to their destination
- Deliveries to the campus will continue to enter from the east along East Avenue, pass through LLNL's Delivery Vehicle Inspection Station (DVIS), and proceed to the LLNL shipping and receiving warehouse where they are picked up by SNL/CA and then delivered into the SNL campus via the East Avenue Corridor Property Protection Area (EACPPA)

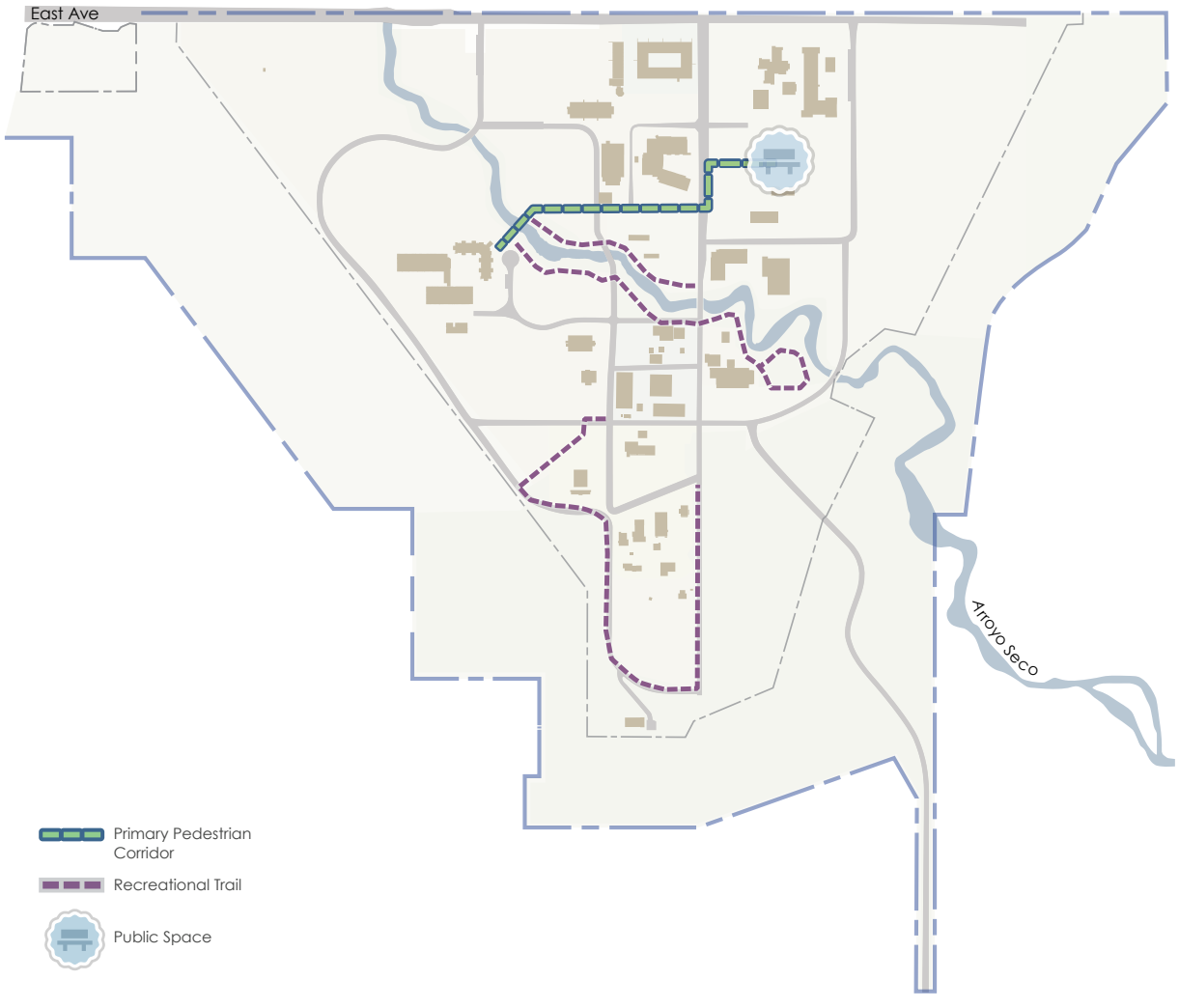


Pedestrian Circulation and Outdoor Areas

Improve and enhance pedestrian and public space network.

- Develop a main east-west pedestrian circulation spine that links the new entrance to the rest of the campus
- Explore the potential of creating an outdoor public space serving as a campus commons as part of new entrance development
- Enhance the existing network of pedestrian walkways and bike paths on campus and complete missing gaps
- Develop recreational walkways along the Arroyo Seco coordinated with natural landscaping

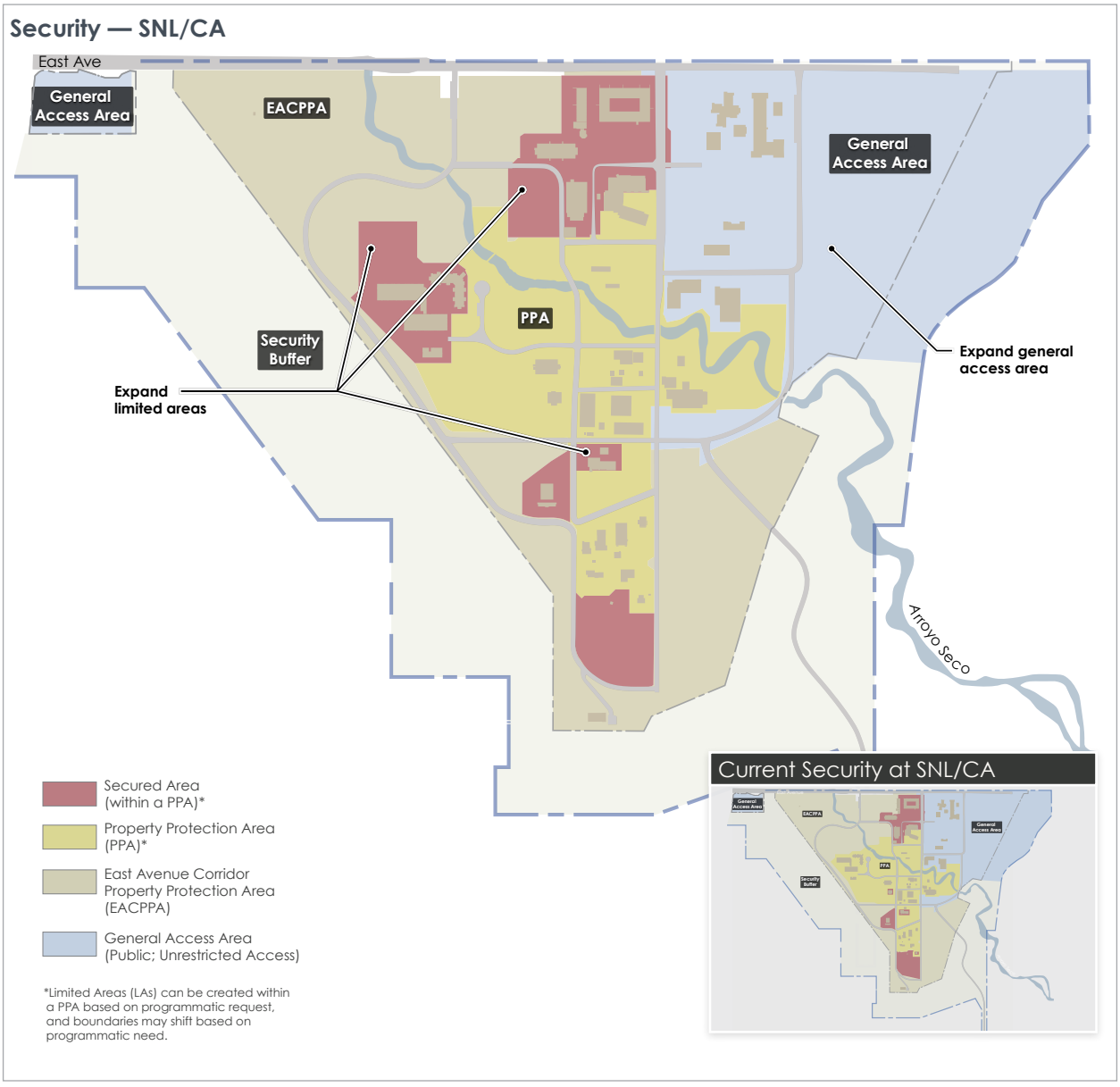
Pedestrian Circulation and Outdoor Areas — SNL/CA



Security

Reshape the site security framework to expand the Limited Area and open portions of the site for external collaboration.

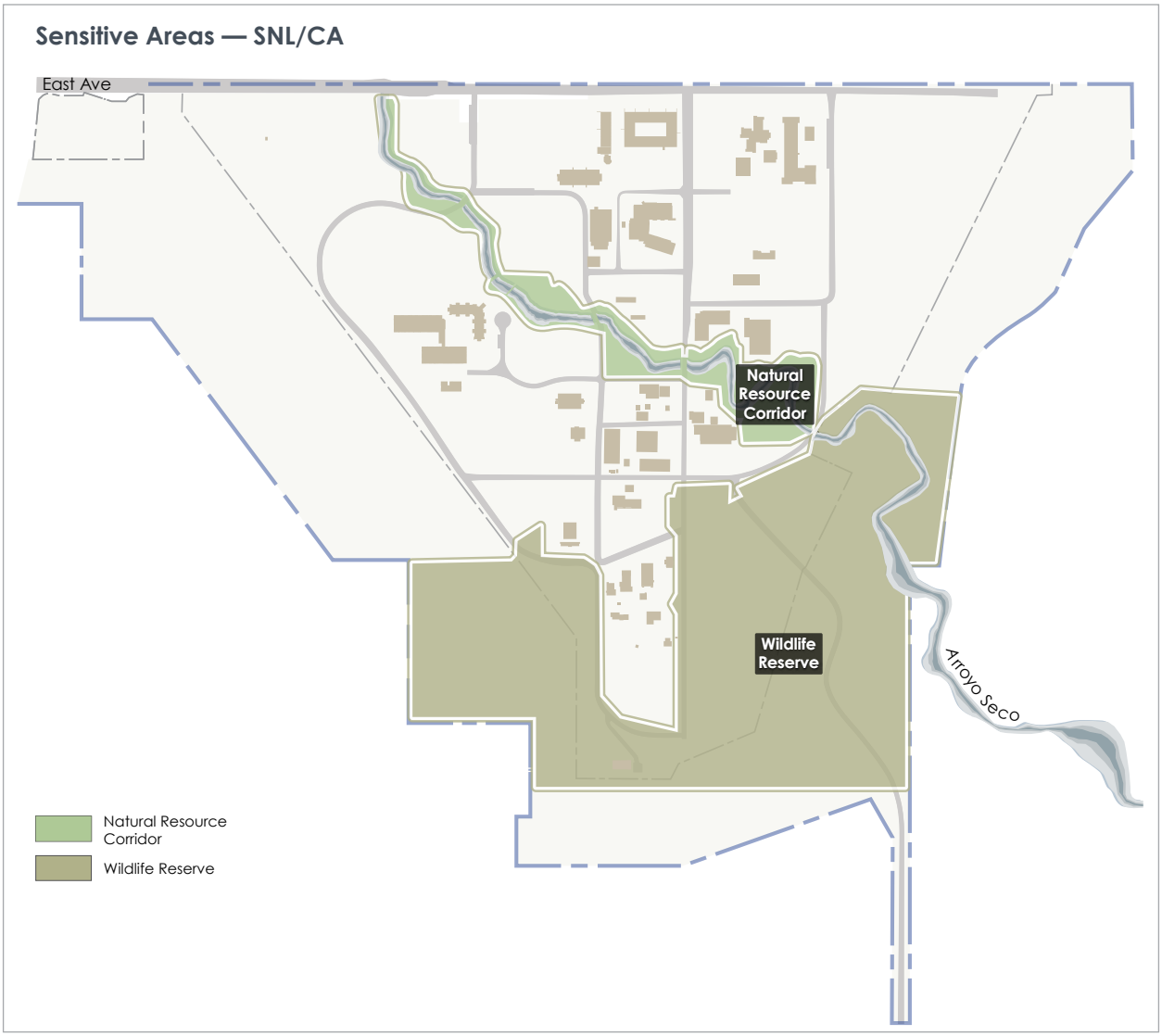
- Expand the General Access Area (GAA) as part of LVOC development to promote unrestricted collaboration with the public sector
- Expand the Limited Area (LA) to accommodate anticipated growth in the classified programs
- Maintain EACPPA that SNL/CA established in cooperation with LLNL
- Maintain the Security Buffer Zone that wraps around the occupied areas of the site on the west, south, and east sides



Environmentally Sensitive Areas

Improve landscape and recreation opportunities at Arroyo Seco.

- Preserve Arroyo Seco as a unique feature that integrates nature into the site
- Utilize the wildlife reserve as habitat for native and migratory species
- Establish recreation pathways along the bank



Currently Contemplated Investments

Implement site and facility investments using a variety of capital funding sources.

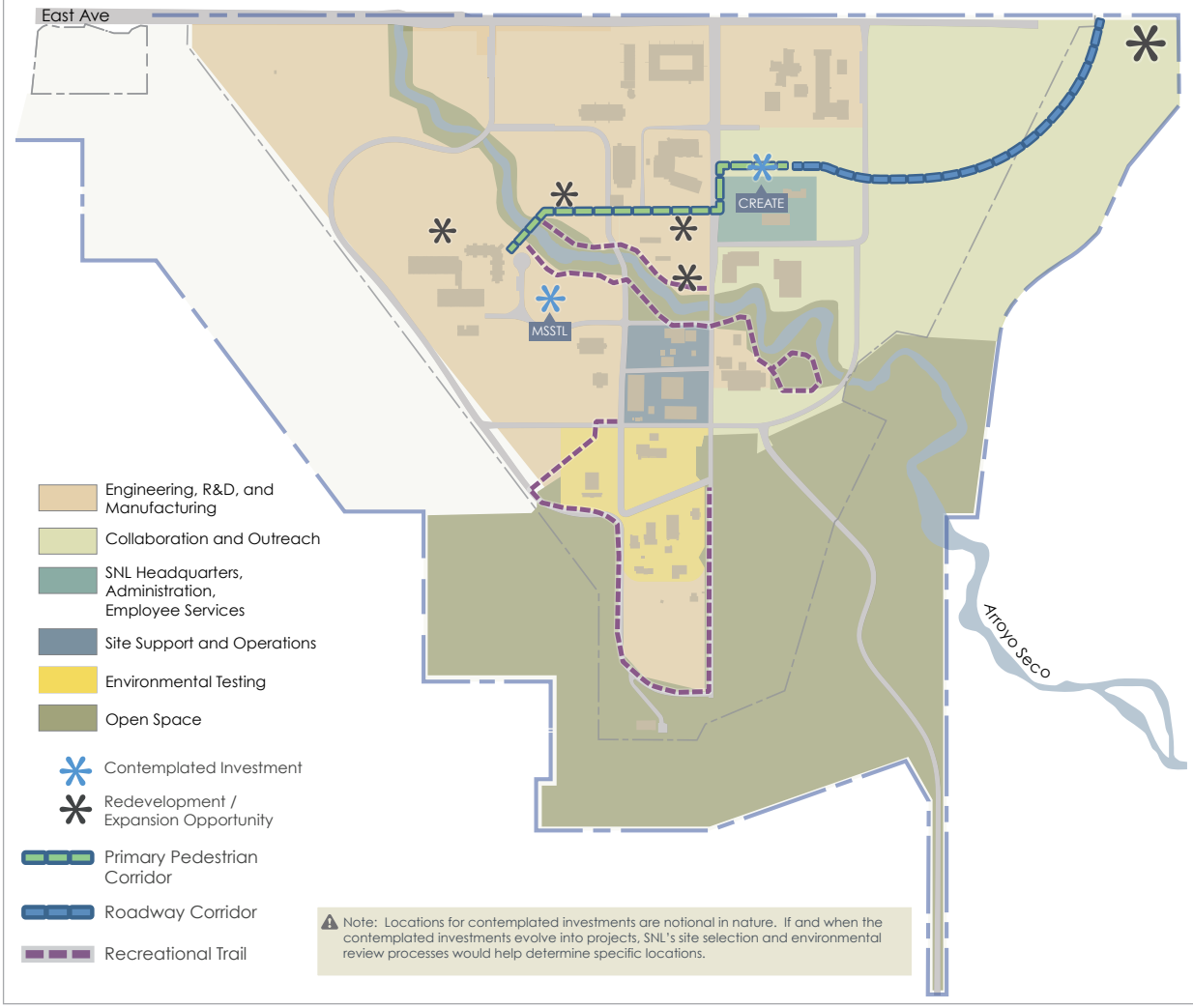
Potential site investments:

- Various renovations and restorations of buildings and infrastructure
- LVOC Infrastructure (roadways, utilities, signage, parking, etc.)

Potential facilities investments:

- Collaboration in Research and Engineering for Advanced Technology and Education (CREATE): third party financing
- Mission Support S&T Laboratory (MSSTL)

Contemplated Investments — SNL/CA



Key Source Documents for this Sub-Area Plan

- Site Development Plan, Sandia National Laboratories, Livermore, California, September 2011
- SNL Long–Range Development Framework, 2010, 2015


Sandia National Laboratories
Distributed Information Systems Laboratories

TA-III

Sub-Area Plan
Overview & Summary

SNL/NM Technical Area III and Remote Areas

A Component of Sandia National Laboratories' Long-Range Development Framework

Developed: 2015
(In Progress)

Sandia National Laboratories

National Nuclear Security Administration

Remote testing facilities at SNL/NM TA-III

Key Features of the TA-III / Remote Areas Sub-Area Plan

The TA-III / Remote Areas Sub-Area Plan is currently under development. Planning concepts under consideration are:

- Continue to use and preserve large tracts of land for large-scale mission-related testing, associated buffers, waste management, and open space
- Identify investments to protect, sustain, and recapitalize these specialized assets
- Identify opportunities to consolidate common functions in order to reduce operating costs
- Explore the potential to enhance employee support facilities and services for those who work in remote areas
- Extend telecommunication infrastructure to TA-III and remote areas, and fill critical gaps

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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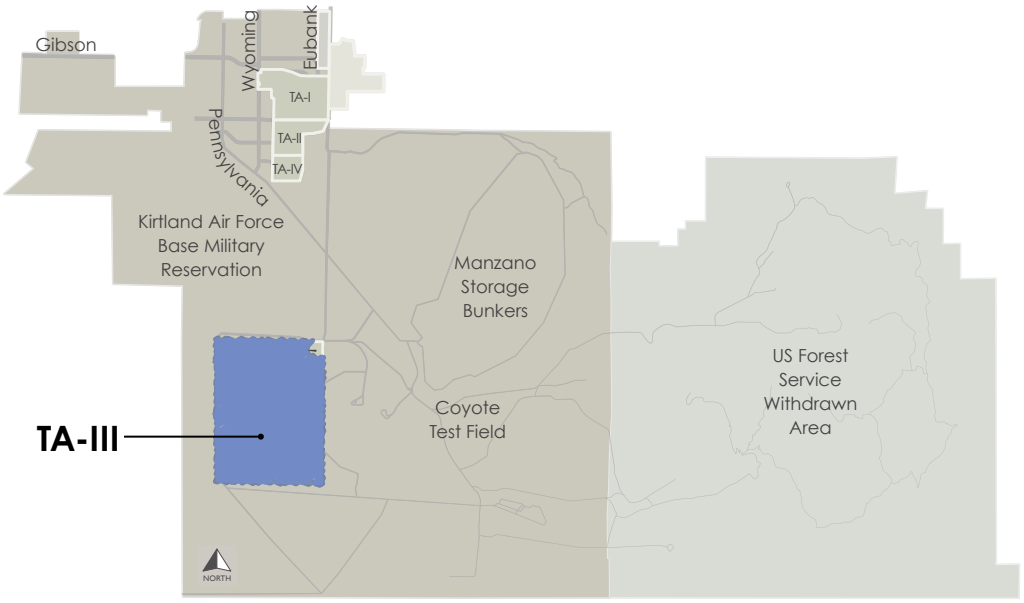
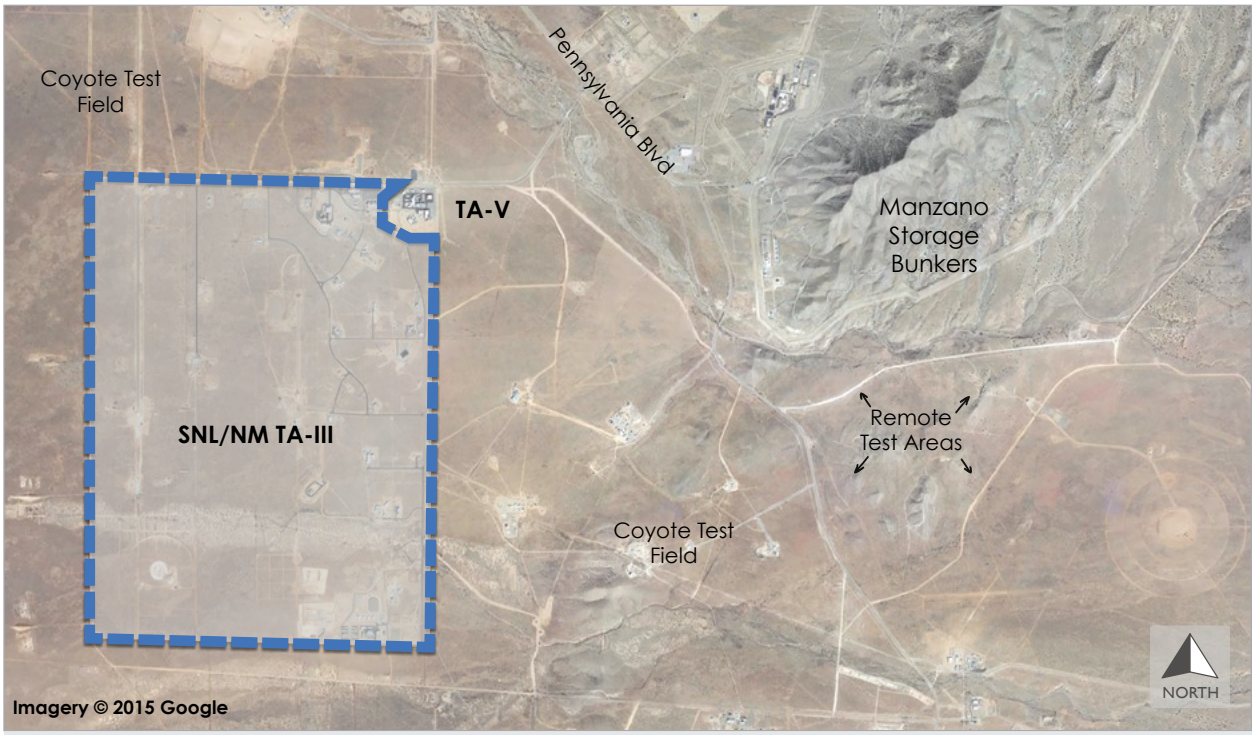
SAND Number: SAND2016-2359 R

Location

TA-III is a remote testing site devoted to full-scale experiments simulating a variety of natural and induced environments. TA-III also has several active and inactive waste facilities.

Sandia also has additional remote hazardous testing areas located outside TA-III, permitted for SNL/DOE use on KAFB land (Coyote Test Field) and on US Forest Service withdrawn land.



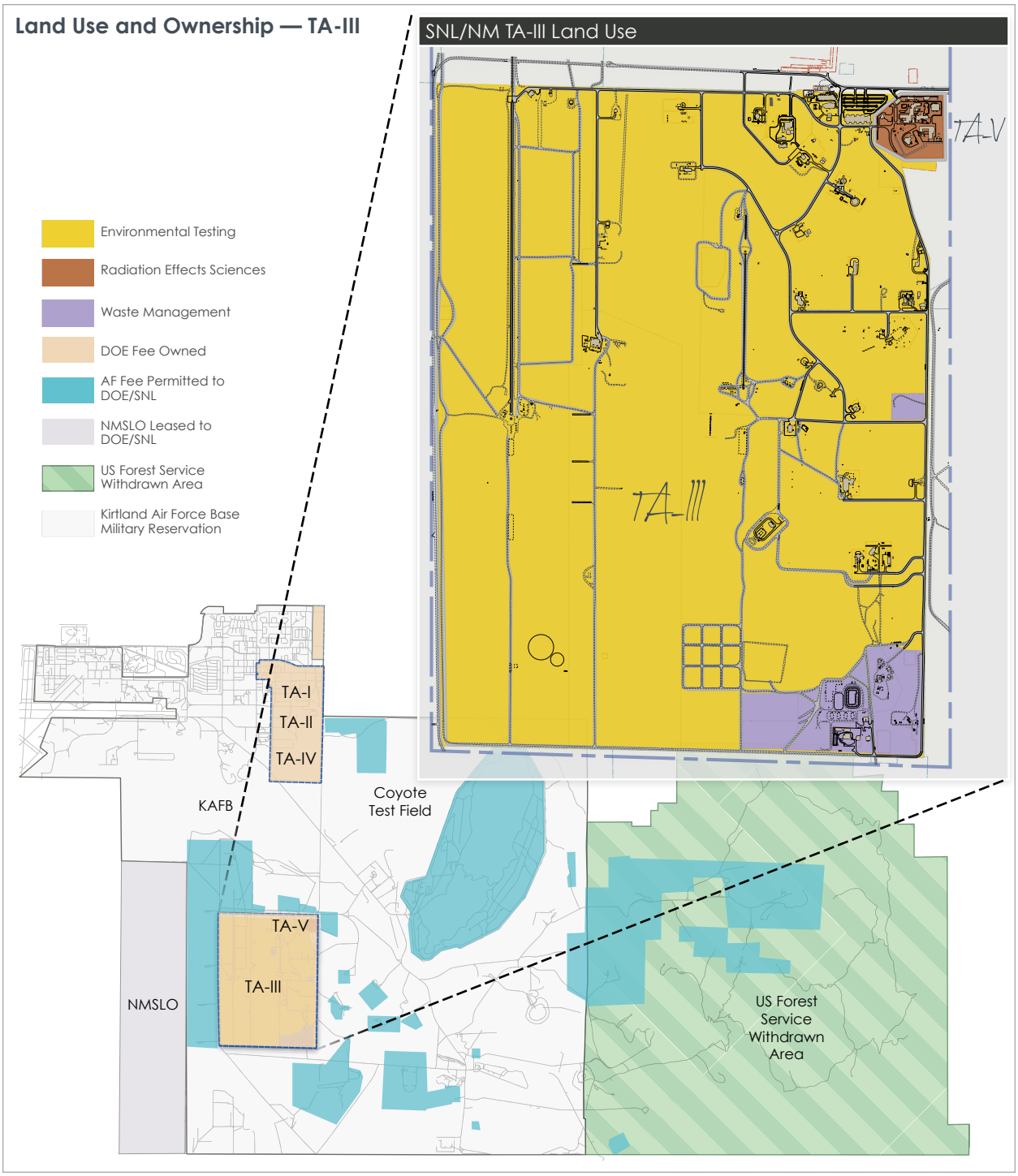


SNL/NM TA-III vicinity

Future Land Use

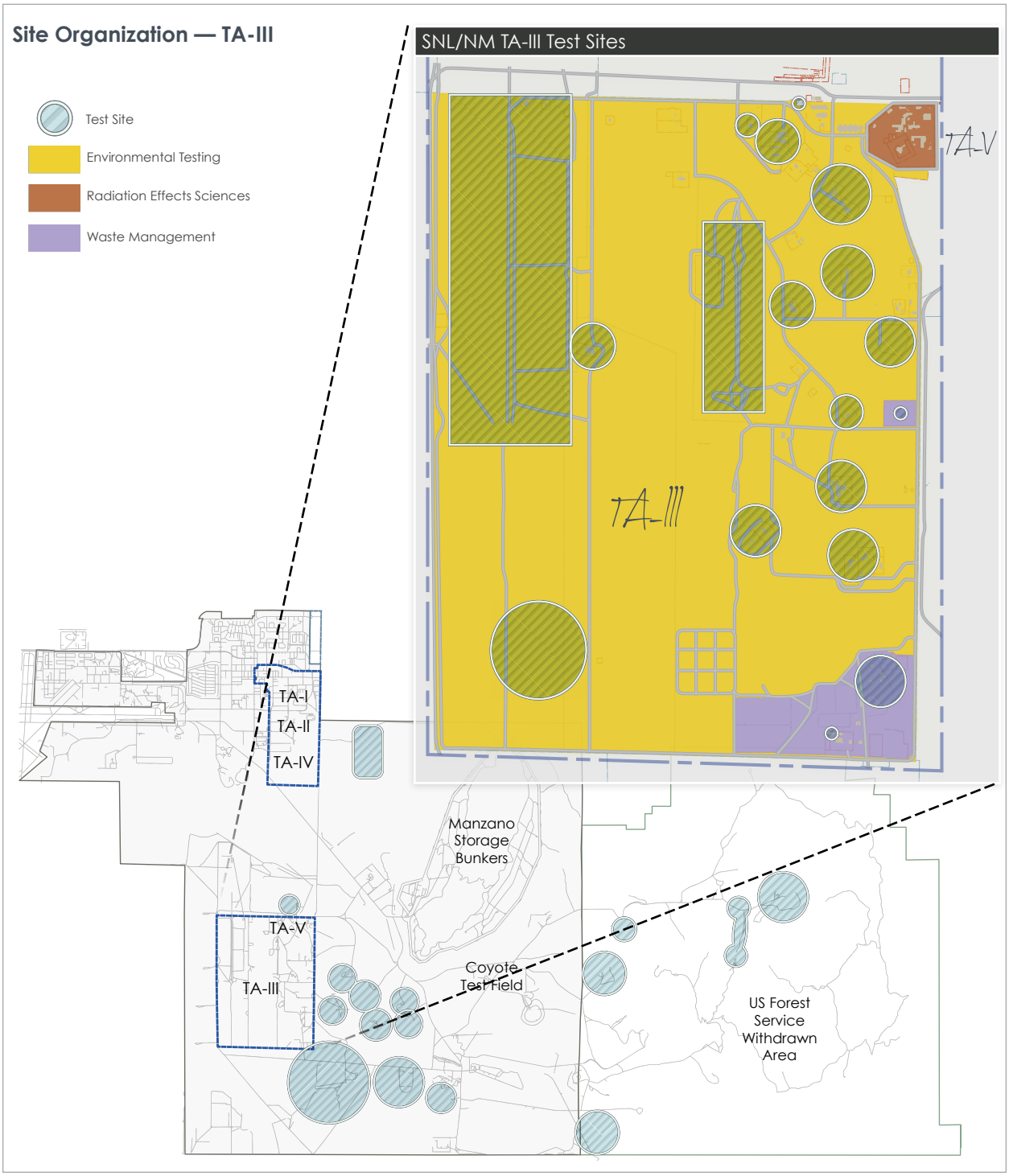
Preliminary planning anticipates that land use at TA-III and Remote Areas will:

- Continue to be used as land for large-scale mission-related testing, associated buffers, waste management, and open space
- Preserve land for open space when not conflicting with testing requirements



Site Organization

- Test sites and facilities within TA-III and the Remote Areas are located primarily with consideration of their unique hazard and buffer requirements
- Monitoring and administrative facilities associated with remote testing are located at the northern portion of TA-III near the access gate to the Property Protection Area (PPA)



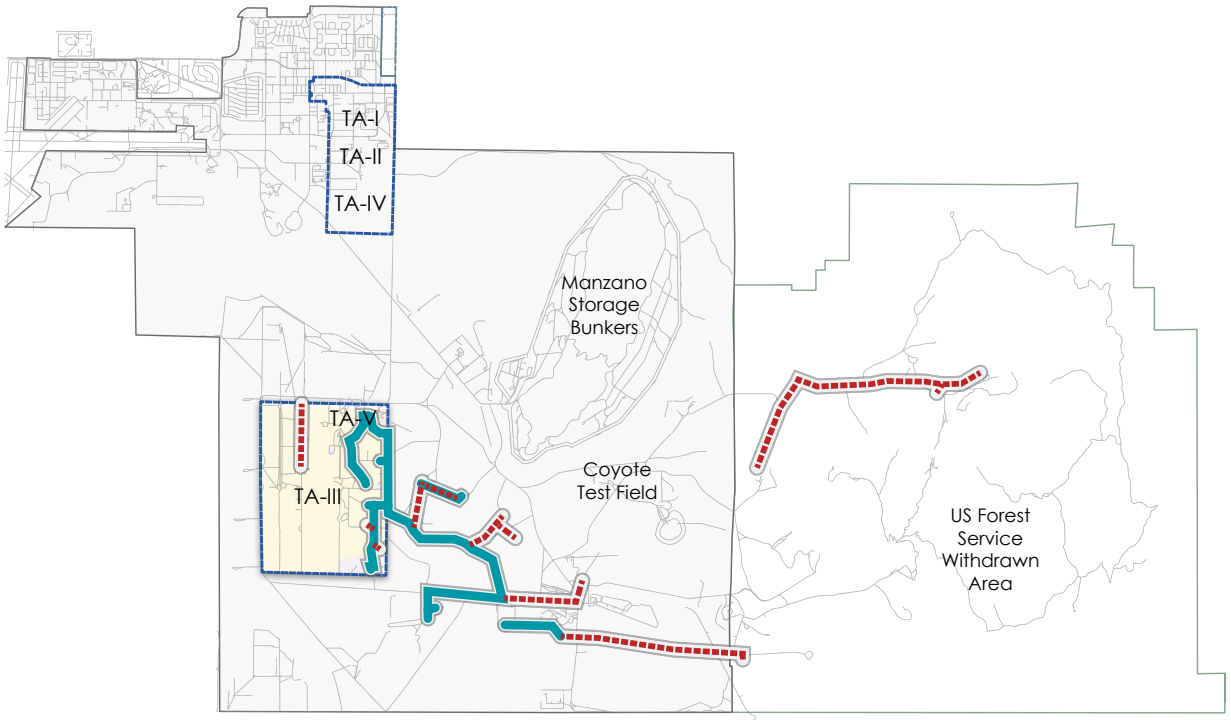
Access, Circulation, and Parking

- Kirtland Air Force Base owns and controls access roads to TA-V, TA-III, and the remote sites
- Sandia owns and controls roads in TA-III
- KAFB-controlled roads may have access issues due to the capacity or condition of the roads, KAFB-initiated road closures, or seasonal flooding
- Sandia staff report congestion due to the limited number of traffic lanes at the Property Protection Area (PPA) access gate situated on the north side of TA-III

Infrastructure Linkages

- The Telecommunications and Technical Security Strategic Plan for SNL/NM Remote Areas describes a strategy to determine and provide appropriate telecommunications and technical security capabilities to Sandia customers in TA-III and the remote areas
- While progress has been made to implement this plan, a number of links remain to be completed (see map below)

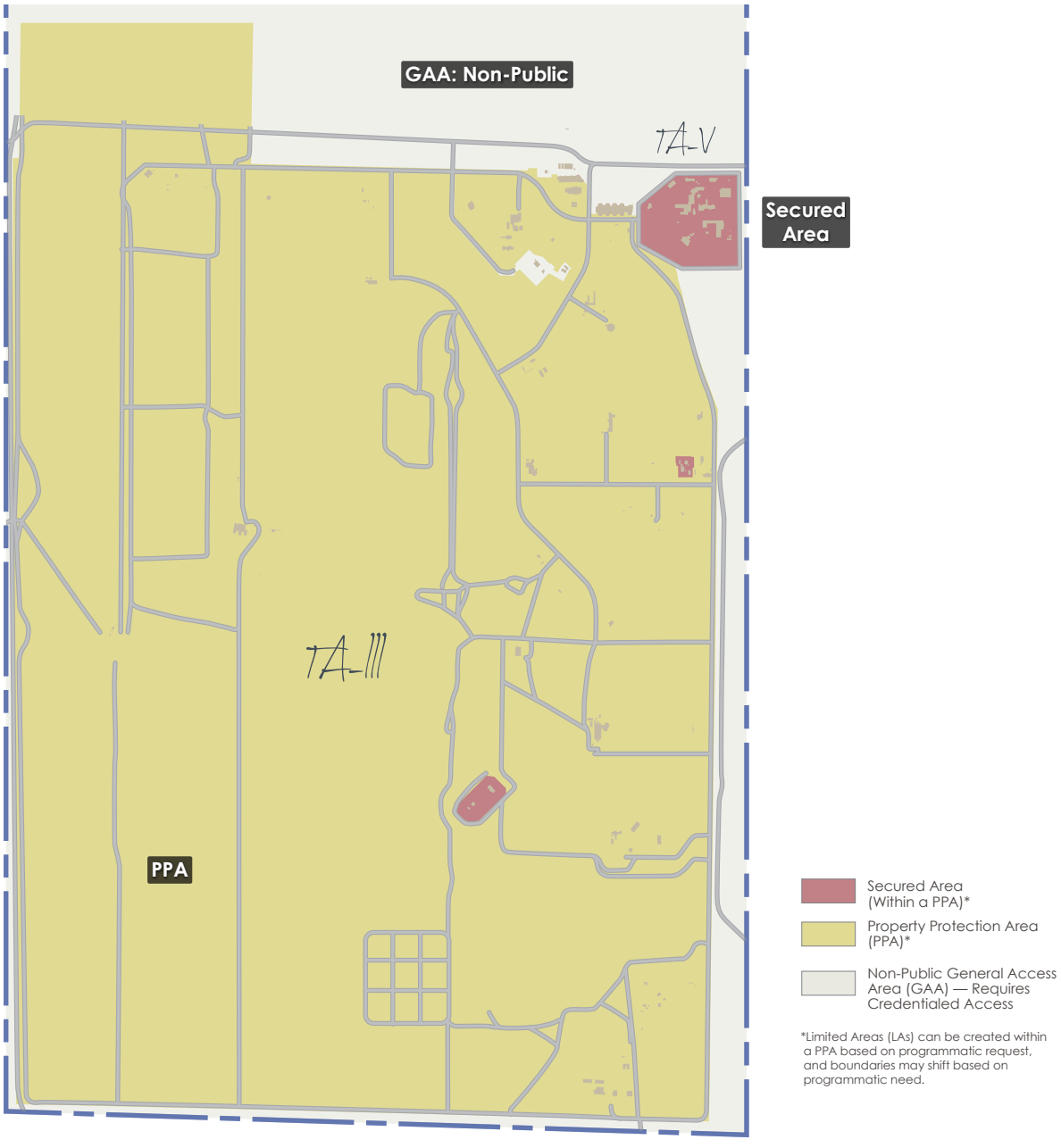
Critical Gaps Remaining in Sandia's Infrastructure — TA-III



Security

- TA-III is within a Property Protection Area (PPA)
- There are Limited Areas (LAs) within the PPA based on programmatic request

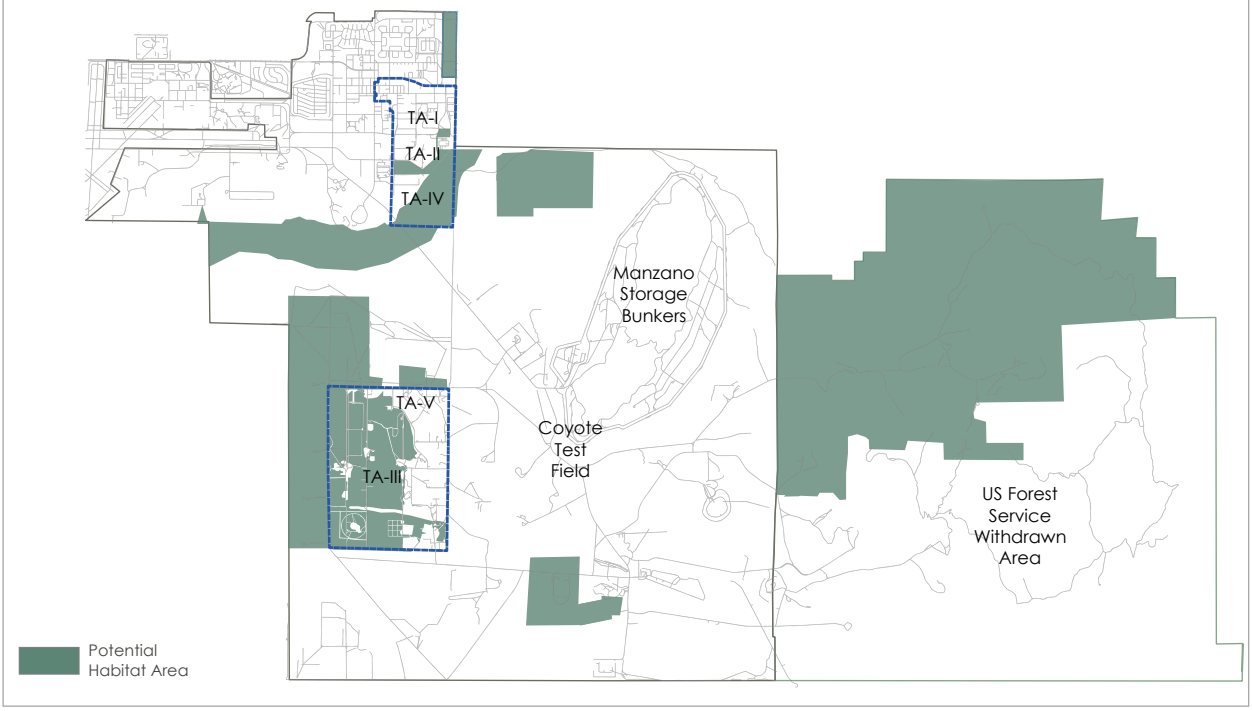
Recommended Security — TA-III



Environmentally Sensitive Areas

- The Operational Area Environmental Evaluation (OAEE) identifies the environmental sensitivity of an area to help inform management decisions about where development may be prohibited, restricted, or subject to additional requirements to comply with federal and state laws and regulations
- The OAEE identifies potential habitat areas which should be given consideration during site selection area development.
- The OAEE advises to consult subject area experts prior to development activities that may affect sensitive areas

Sensitive Areas — TA-III



Currently Contemplated Investments

The TA-III / Remote Areas Sub-Area Plan is currently under development and will identify additional contemplated investments. Known contemplated investments include:

- Telecommunication infrastructure investments to provide telecommunication linkages in TA-III and the remote areas
- Access improvements at the PPA entrance on the north end of TA-III
- Improvements to Building 6630
- Coordinate with Kirtland Air Force Base to provide bike lanes along Pennsylvania Ave SE

📖 Key Source Documents for this Sub-Area Plan

- Operational Area Environmental Evaluations (OAEE), September 2011
- SNL Long–Range Development Framework, 2010, 2015
- Telecommunications and Technical Security Strategic Plan for SNL/NM Remote Areas, April 2015

Sandia National Laboratories

TA-V

Sub-Area Plan
Overview & Summary

SNL/NM Technical Area V

A Component of Sandia National Laboratories'
Long-Range Development Framework

Developed: 2015
(In Progress)

Sandia National Laboratories

National Nuclear Security Administration

SNL/NM TA-V facilities

Key Features of the SNL/NM TA-V Sub-Area Plan

The TA-V Sub-Area Plan is currently under development. A major input into the plan will be the results of a strategic planning study to be conducted in FY 2016 that will investigate the long-term programmatic future for TA-V. Anticipated planning issues to be explored include:

- Nature of future programs and facility needs
- Recapitalization needed to sustain key facilities and resources
- Validation of existing land use as a remote nuclear research and radiation testing site
- Physical security requirements including the need to sustain or reconfigure the existing Perimeter Intrusion Detection and Assessment System (PIDAS)
- Environmental remediation and restoration strategy
- Site design improvements needed to enhance the quality of the working environment

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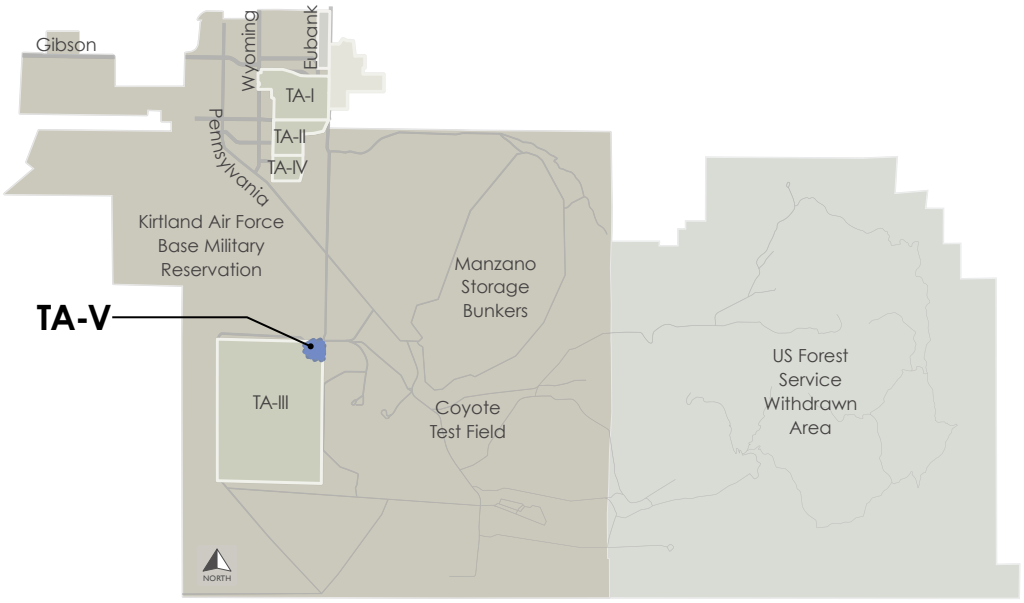
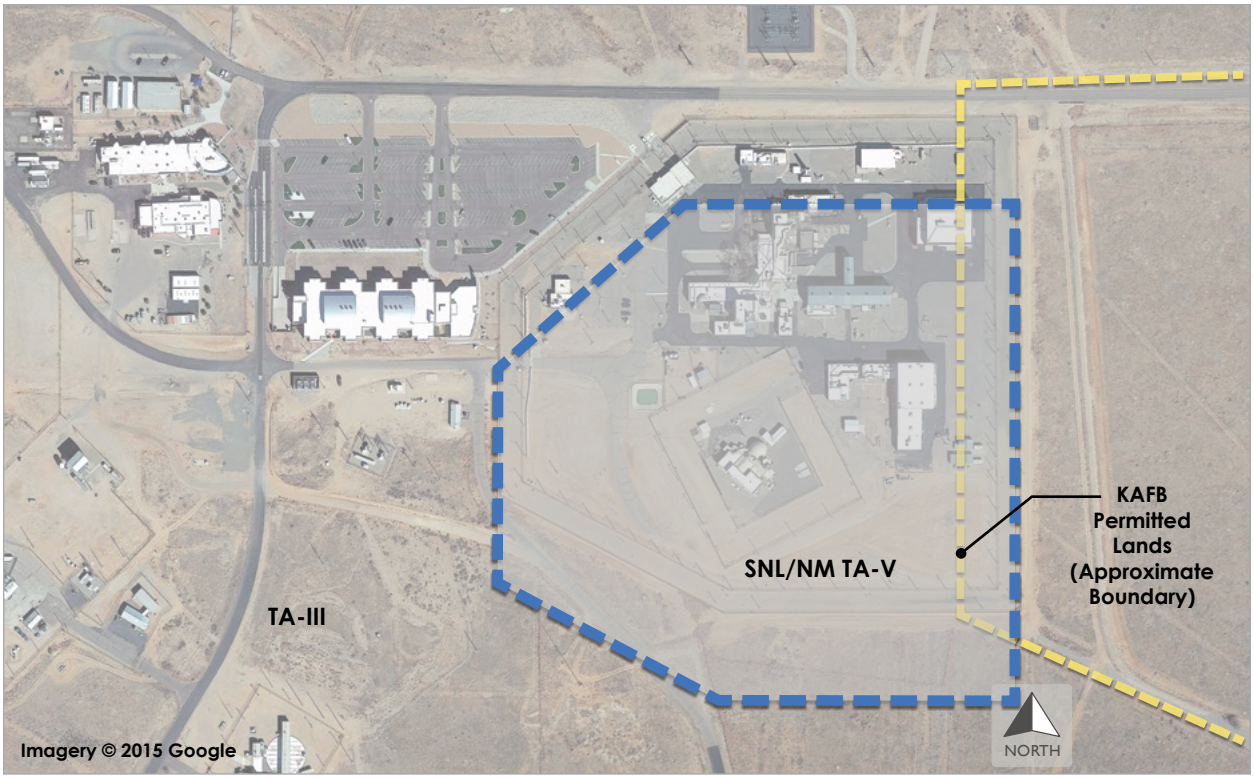
SAND Number: SAND2016-2360 R

Location

- Technical Area V is a remote, secure radiation testing site located at the northeast corner of TA-III
- A portion of the eastern edge of TA-V is permitted from the U.S. Air Force



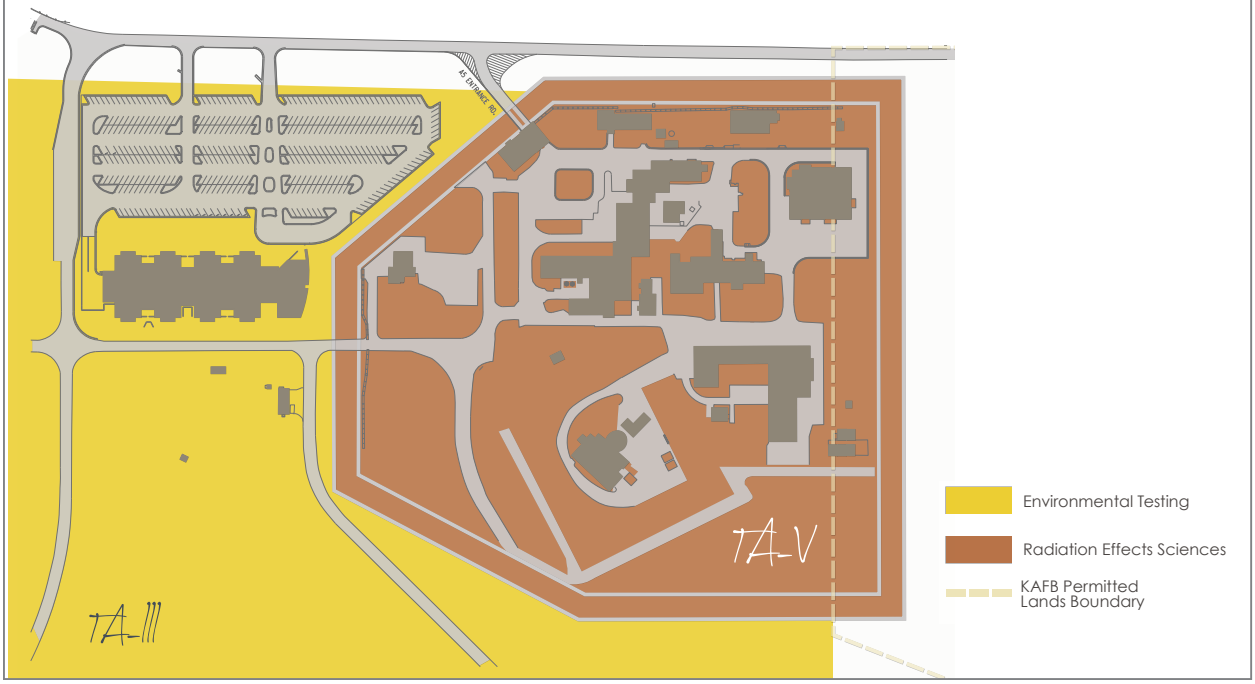


Future Land Use

The TA-V Sub-Area Plan is currently under development.

- Current land use is as a remote nuclear research and radiation effects testing site
- Sandia will initiate a strategic planning study in 2016 that will inform future land-use decisions

Land Use — TA-V



Site Organization

The TA-V Sub-Area Plan is currently under development.

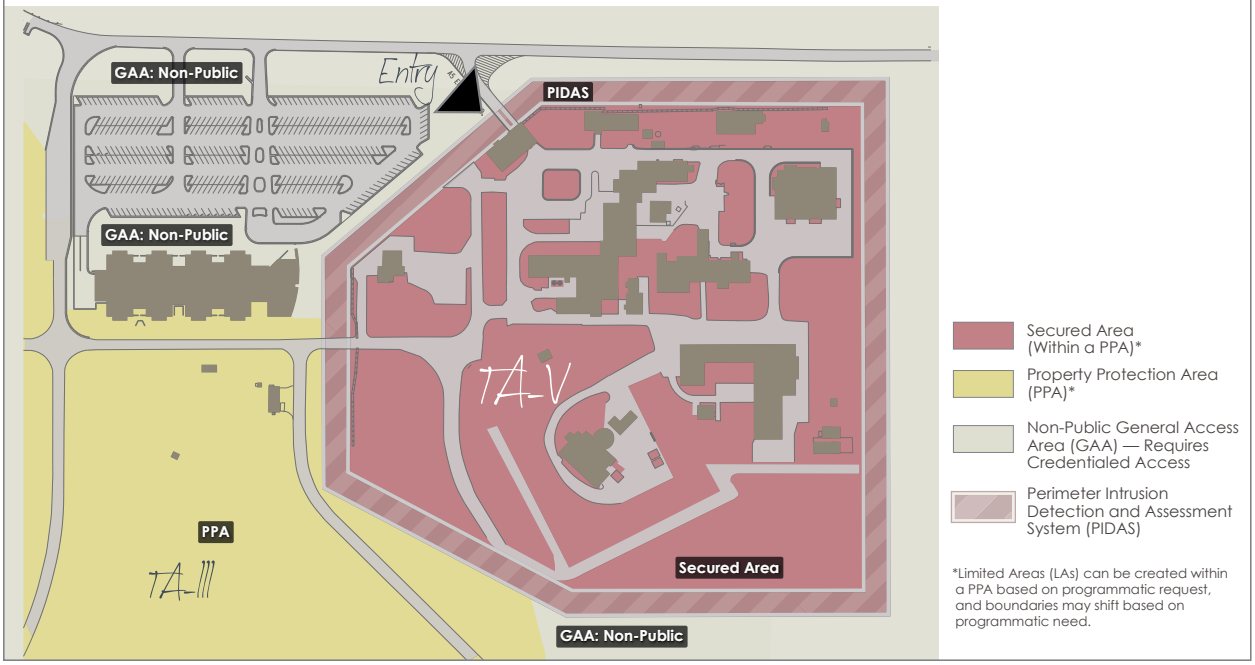
Access, Circulation, and Parking

- Kirtland Air Force Base owns and controls access roads to TA-V, TA-III, and the remote sites
- Sandia owns and controls roads in TA-V
- KAFB controlled roads may have access issues due to the capacity or condition of the roads, KAFB-initiated road closures, or seasonal flooding

Security

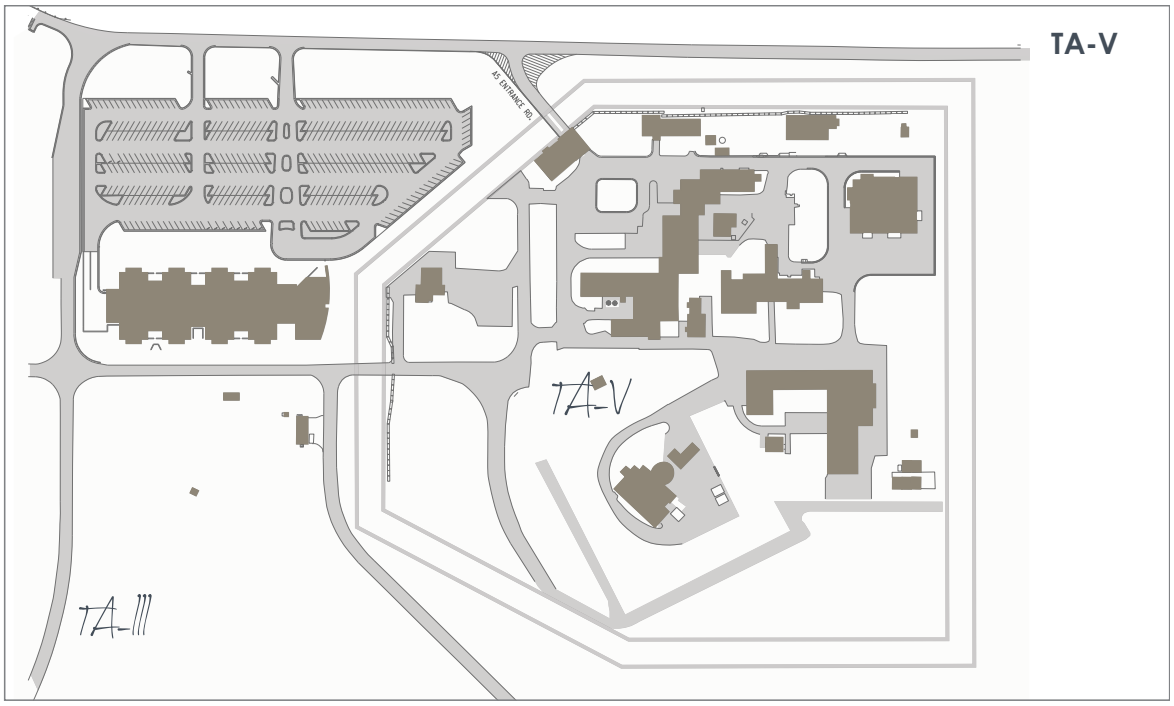
- TA-V is a secured area — a Limited Area (LA) within a Property Protection Area (PPA)
- The existing PIDAS is inactive
- A strategic planning study soon to be initiated will inform the need to sustain or reconfigure the existing inactive PIDAS

Security — TA-V



Environmentally Sensitive Areas

- Tech Area V does not have established habitat of concern



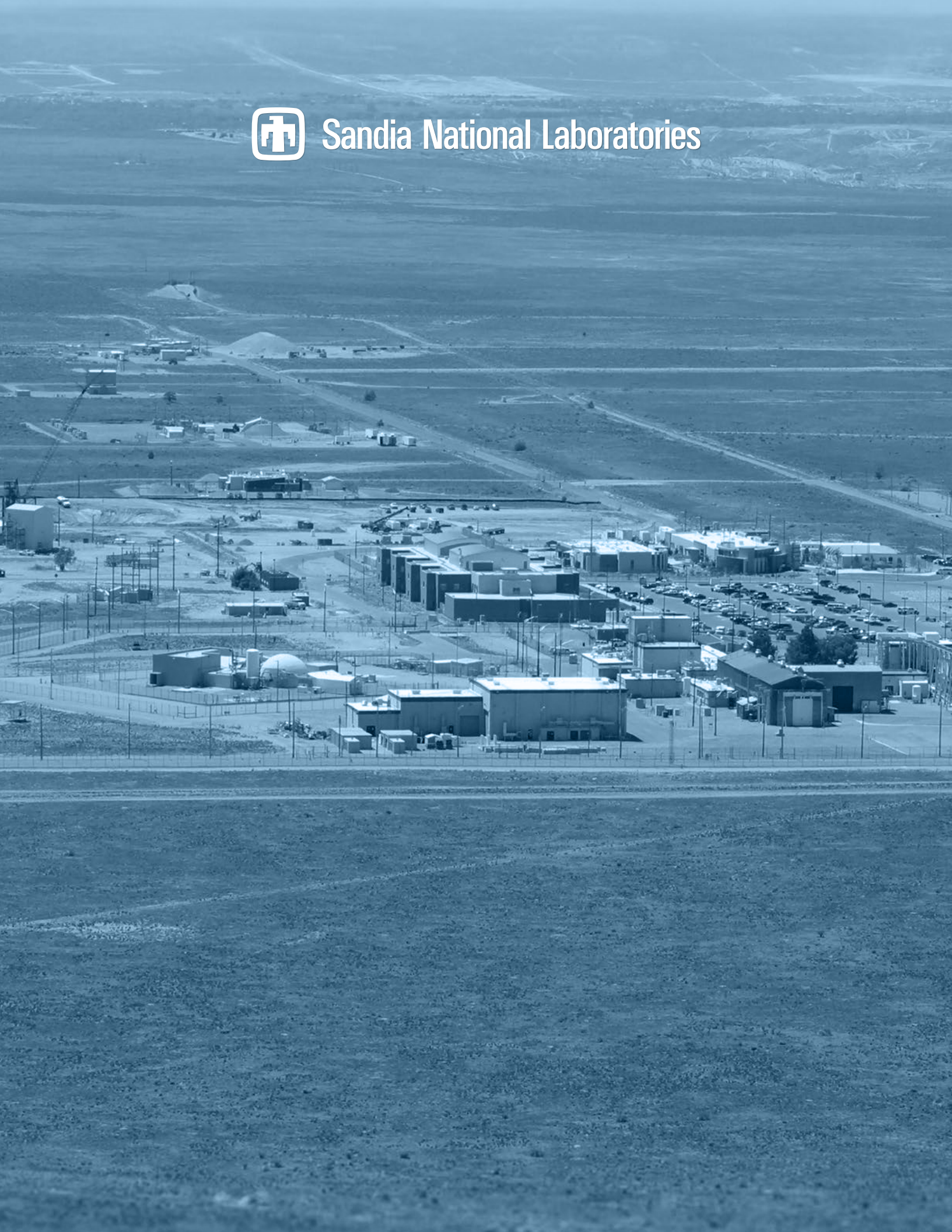
Currently Contemplated Investments

The TA-V Sub-Area Plan is currently being developed. Sandia will initiate a strategic planning study that will examine and validate the contemplated investments listed below, and will help to identify any additional potential investments:

- Annular Core Research Reactor Facility
- Demolition of Building 6580

📖 Key Source Documents for this Sub-Area Plan

- SNL Long–Range Development Framework, 2010, 2015


Sandia National Laboratories

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TTR Sub-Area Plan
Overview & Summary

Tonopah Test Range (TTR)

A Component of Sandia National Laboratories'
Long-Range Development Framework

March 2016

Sandia National Laboratories

National Nuclear Security Administration

Test Area 3 of Tonopah Test Range (TTR) in south-central Nevada

Key Features of the TTR Sub-Area Plan

The TTR Sub-Area Plan is currently under development and is significantly influenced by National Nuclear Security Administration (NNSA) decisions about permitting and environmental regulatory compliance issues. The sub-area plan will build upon previous draft master plans, F&I revitalization plans, and building studies. Planning concepts under consideration are:

- Continue to use and preserve large tracts of land for large-scale mission-related testing
- Identify investments to protect, sustain, and recapitalize infrastructure, facilities, and equipment assets
- Identify opportunities to dispose of obsolete facilities and consolidate common functions in order to reduce operating costs

U.S. DEPARTMENT OF ENERGY | Sandia National Laboratories

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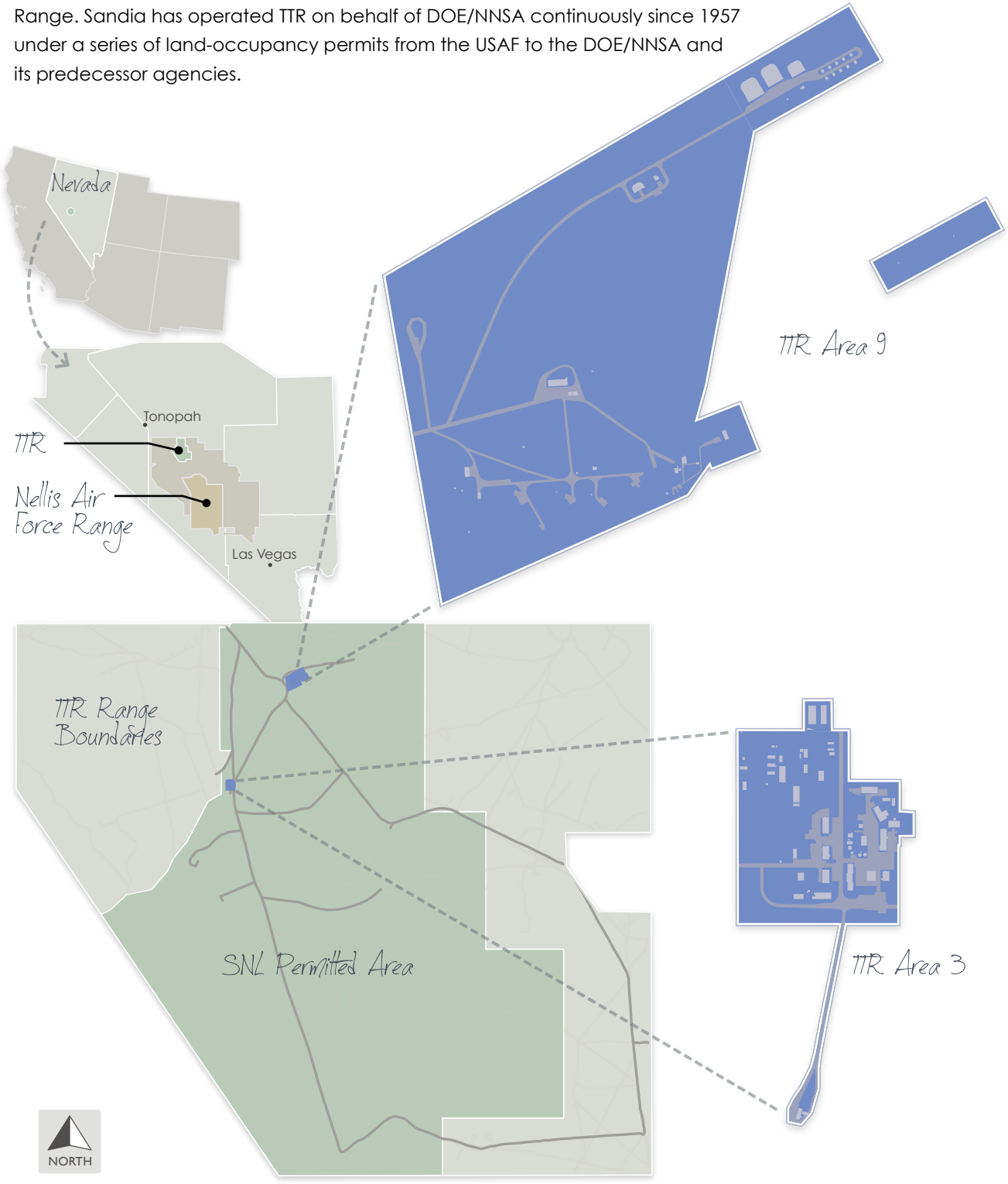
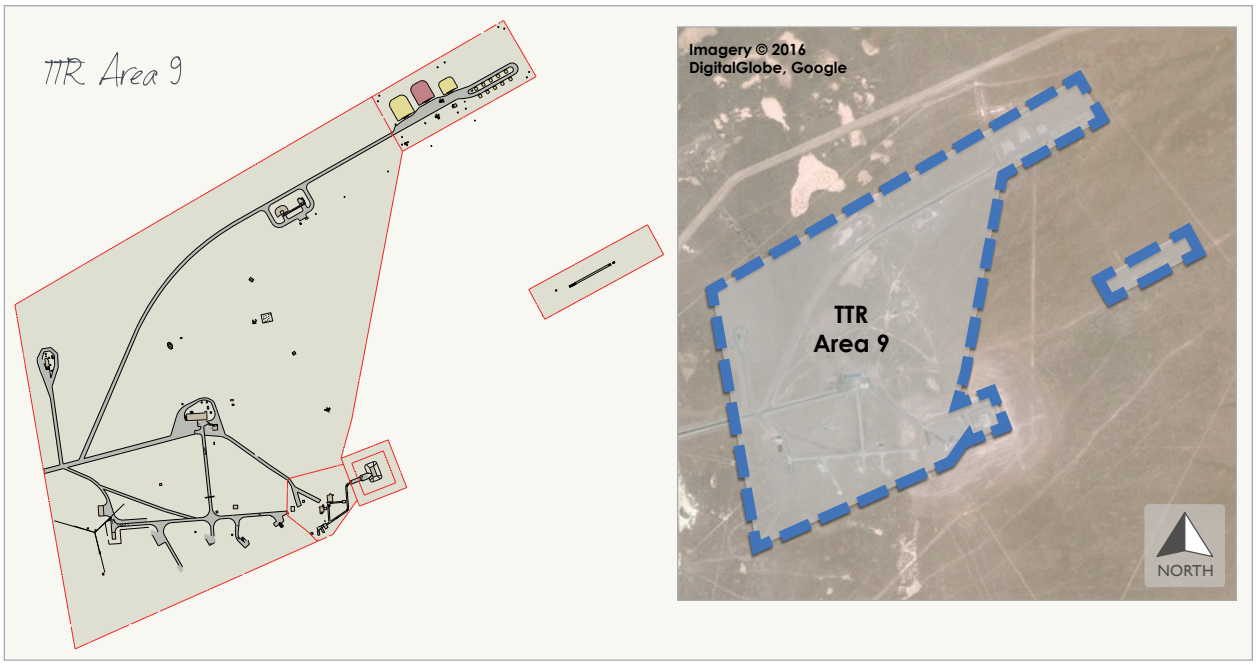
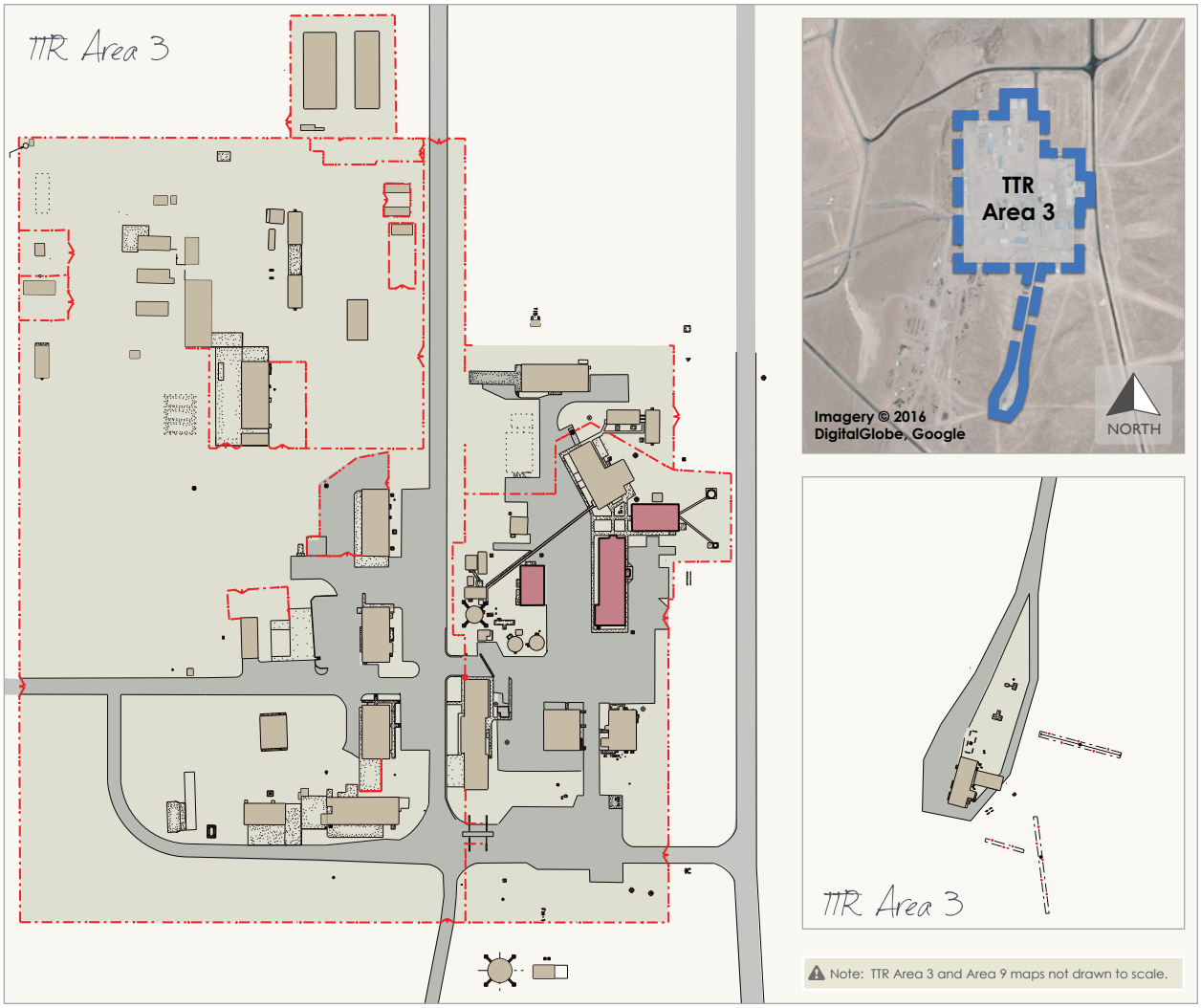
SAND Number: SAND2016-2399 R

Location

Tonopah Test Range (TTR) encompasses 280 square miles in south-central Nevada, approximately 160 miles north of Las Vegas and within the boundaries of the Air Force Nevada Test and Training Range. Sandia has operated TTR on behalf of DOE/NNSA continuously since 1957 under a series of land-occupancy permits from the USAF to the DOE/NNSA and its predecessor agencies.




TTR Area 9
Imagery © 2016
DigitalGlobe, Google
TTR
Area 9
NORTH


TTR Area 3
TTR
Area 3
Imagery © 2016
DigitalGlobe, Google
NORTH
TTR Area 3
Note: TTR Area 3 and Area 9 maps not drawn to scale.

Capabilities

TTR provides stockpile evaluation and research and development test support for the DOE/ NNSA-funded weapon projects as well as other government agencies and their contractors. TTR is the only full-scale test facility in the U.S. dedicated to integrated flight system development and certification (without nuclear yield) of air-delivered nuclear bombs. The remote location of the range, situated between two mountain ranges, and with restricted airspace, ensures that tests can be conducted with a high degree of safety and security. Mission critical capabilities at TTR include the Test Operations Center, tracking radars, optical tracking systems, telemetry, and communications.

Currently Contemplated Investments

Sandia has made progress in investing in key portions of the infrastructure and recapitalizing mission critical tools. However, reliable support of the high rate of anticipated testing will require additional investments, including:

- Backup and clean power systems for mission critical infrastructure
- Communications infrastructure, to include a rangewide fiber optic system
- Support systems for the Test Operations Center
- Bandwidth upgrade
- Roofing replacements
- Facility remodels

Other facilities and infrastructure systems have significant deferred maintenance and will eventually require investment, including:

- Electrical power substation and distribution system
- Roadway and parking area repair
- Exterior building repair (roofing and reskinning)
- Replacement of a significant portion of weapon recovery equipment

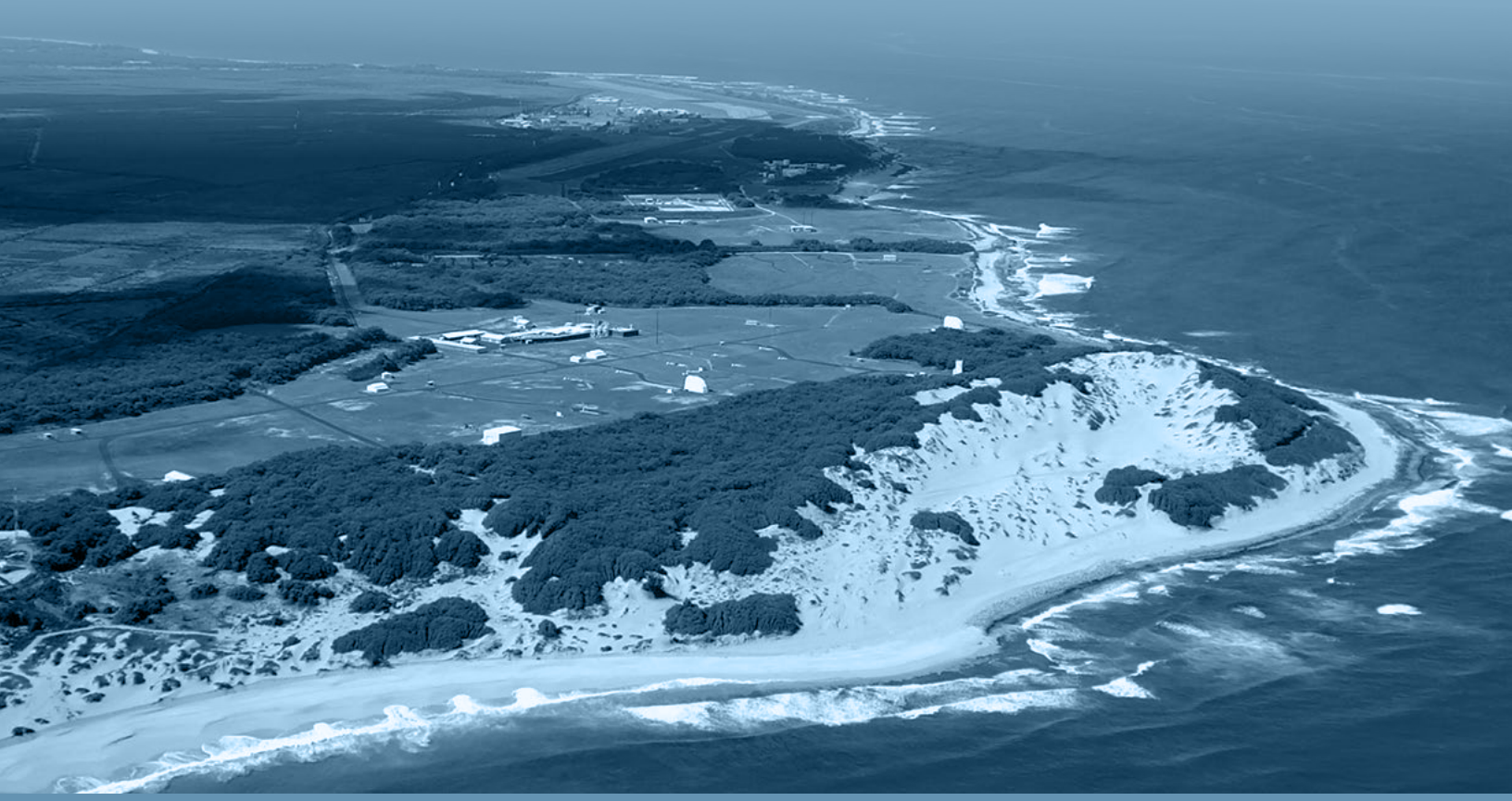
📖 Key Source Documents for this Sub-Area Plan

- SNL Long–Range Development Framework, 2010, 2015
- Tonopah Test Range Area 03 Facilities Master Plan, December 2012
- TTR F&I Revitalization Masterplan Phase II, August 22, 2013
- TTR Buildings 03-69, 03-56 and 03-57 Optimization Study, October 2015

Sandia National Laboratories

KTF

Sub-Area Plan
Overview & Summary



Kauai Test Facility (KTF)

A Component of Sandia National Laboratories'
Long-Range Development Framework

March 2016

Sandia National Laboratories

National Nuclear Security Administration

Kauai Test Facility (KTF) currently occupies about 132 acres within US Navy Pacific Missile Range Facility (PMRF) at Barking Sands, Kauai, Hawaii.

Key Features of the KTF Sub-Area Plan

The KTF Sub-Area Plan is currently under development. Finalization awaits decisions regarding the long-term future of the site. The sub-area plan will build upon previous master plans, facilities and infrastructure (F&I) revitalization plans, and building studies. Planning concepts under consideration are:

- Replace facilities with a combination of new permanent and non-permanent space
- Complete deferred maintenance at remaining facilities

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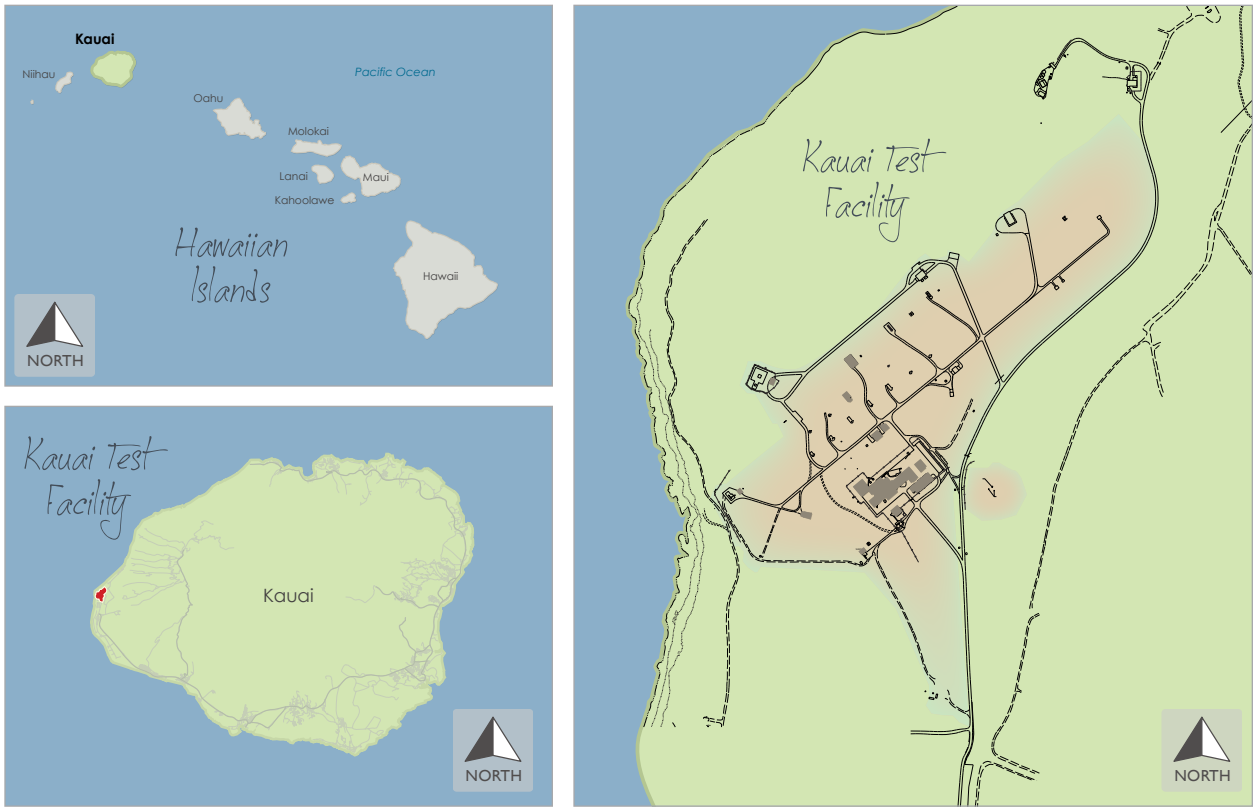
SAND Number: SAND2016-2361 R

Location

The Kauai Test Facility (KTF) is a Sandia National Laboratories (SNL) rocket launch range operated in Hawaii for the Department of Energy. KTF consists of approximately132 acres located on the grounds of the Navy's Pacific Missile Range at Barking Sands (PMRF). KTF has several repeater sites along the Hawaiian Island chain that are an integral part of the test facility, and crucial to continued successful operations.



KTF is a tenant on the US Navy Pacific Missile Range Facility (PMRF) at Barking Sands, located on the westernmost extension of the Hawaiian island of Kauai.

Capabilities

The facilities and personnel support a variety of sounding rocket launch missions, including weapons research and development, operational training, test and evaluation, and technology development in support of Sandia's Special Partnership (SSP) research and development activities.

While there has been some question about KTF's future, DOE has indicated an interest in maintaining the site. Sandia is exploring potential ways to diversify the use of the site by identifying other potential research and development (R&D) users that require testing and evaluation in a tropical maritime environment. This effort may increase the long-term viability of the site.

Currently Contemplated Investments

KTF has operated for many years on a limited budget that cannot meet the ongoing maintenance and facility renewal needs of the facility, resulting in a backlog of deferred maintenance. A significant number of buildings at KTF have exceeded their expected useful life. Deteriorating facilities and infrastructure place the viability of the site at risk, jeopardizing both the capabilities of the site and the business it generates for Sandia National Laboratories.

Sandia assessed the site condition in 2006, resulting in a five-year needs and cost profile that incorporates a strategy to replace facilities with a combination of new permanent and non-permanent space, and to complete deferred maintenance at remaining facilities. Current F&I planning identifies the need to improve infrastructure and replace facilities that have exceeded their useful life, or have been abandoned and are awaiting funding for decontamination and demolition.

High Priority Investments

- Upgrade site power infrastructure

Medium Priority Investments

- D&D funding needed to remove excess and unsafe buildings and structures
- Replace deteriorated administrative trailers and provide additional space to support tests

Kauai Test Facility

📖 Key Source Documents for this Sub-Area Plan

- SNL Long–Range Development Framework, 2010, 2015
- SNL Kauai Test Facility Master Plan (Draft), September 2007
- Planning for the Future of the Kauai Test Facility, 2008

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Sandia National Laboratories

SS&TP

Sub-Area Plan
Overview & Summary

Sandia Science & Technology Park

A Component of Sandia National Laboratories' Long-Range Development Framework

Sandia National Laboratories

National Nuclear Security Administration

Introduction

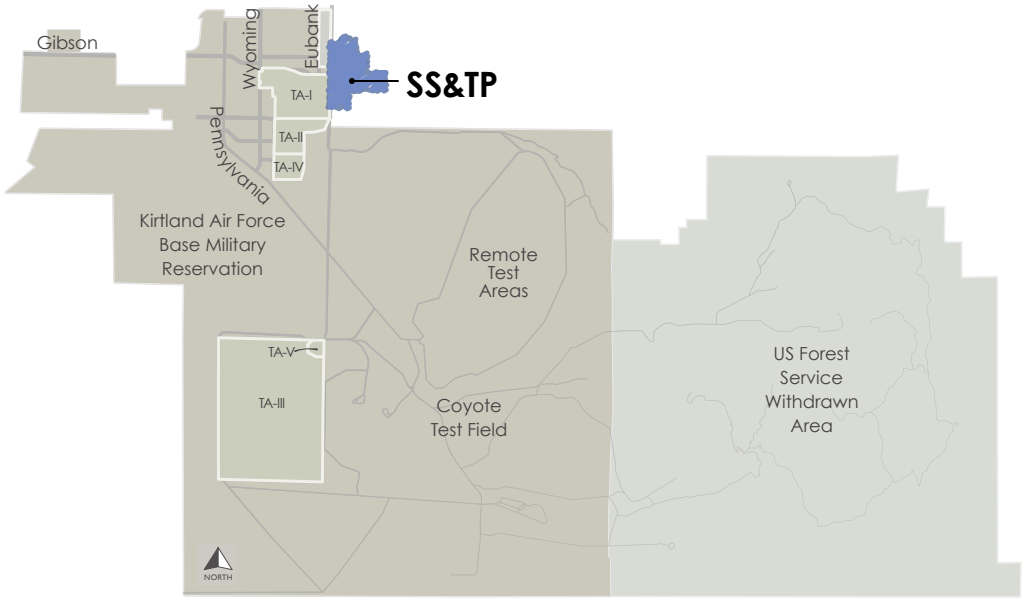
The Long-Range Development Framework (LRDF) guides effective, efficient, and sustainable land and infrastructure development for Sandia National Laboratories' (SNL) New Mexico and California campuses. Companion Sub-Area Plans provide greater detail about the long-range (20+ years) development vision and capital investment requirements, and opportunities for specific campus areas.

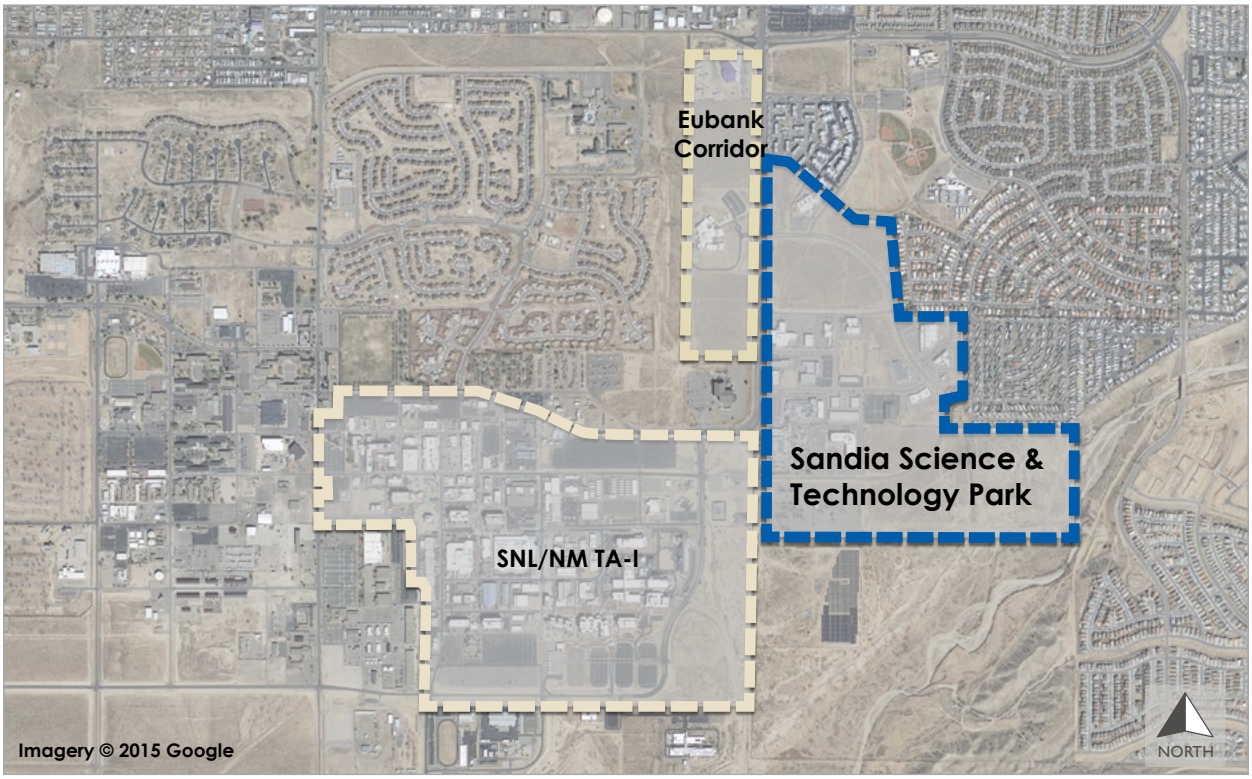
The purpose of this Strategic Planning Framework for the Sandia Science & Technology Park (SS&TP) is to describe an appropriate role for the SS&TP to meet Sandia's's space needs and provide principles for evaluating Sandia functions to consider for relocation from the New Mexico site to the SS&TP.

SS&TP resides in the high desert Manzano Mountain foothills of Albuquerque, New Mexico.

Location

SS&TP resides east of Sandia National Laboratories and Kirtland Air Force Base, extending along the south end of Eubank Boulevard.





Considerations in Leasing at SS&TP

By virtue of its location just outside the KAFB/SNL perimeter, the SS&TP is an ideal location for organizations whose programs involve extensive/intensive external collaboration, but still require close proximity to the main Sandia campus. The overall diminishing National Nuclear Security Administration (NNSA) funding environment for capital projects and lengthy approval and construction processes justify a continued role for SS&TP in providing space for very specific functions under very specific circumstances.

Relocating certain work groups to the SS&TP supports a long-term, on-site effort to provide additional space and facilities through redevelopment and new construction. Relocating appropriate work groups and functions to the SS&TP through a build-to-suit arrangement can provide Sandia with needed flexibility to meet near- and mid-term space/facilities needs, and prove cost-effective.

For larger facilities and if suitable space is available for lease in the market area, acquisition of leased space is usually faster than obtaining approval and construction of comparable line item space. Strategic Partnership Project (SPP) programs that have access to adequate annual operating funds, but not long-term capital construction opportunities, could consider leasing if there is no appropriate opportunity to solve the need through restoration and renovation of an existing structure and the function can be performed in general purpose space that does not require specialized security measures.

Leases at the SS&TP can provide Sandia with the opportunity to provide temporary space for:

- Centers whose facilities could be renovated when funding is available, but are precluded from being renovated as they lack swing space
- Seasonal fluctuations in student and intern populations
- Staffing fluctuations that result from special projects or campaigns with limited durations

Principles Guiding Evaluation of Groups Seeking or Under Consideration for Relocation to the SS&TP

These general principles will guide leasing decisions at the SS&TP. The principles provide Facilities Management and Operations Center (FMOC) and Sandia Executive Management a basis to evaluate the nature and extent of benefits and liabilities of the lease to Sandia and organization operations/mission.

- Core mission work groups and centers should remain on site. On-site locations offer access to amenities such as staff interaction and programmatic colocation, security, medical services, food service, and specialized emergency response services. Some services, including classified security and communications, may be difficult to provide in a leased facility off site.
- Primary SS&TP tenants should be those organizations having considerable interaction with academia, industry and foreign nationals
- The primary use of leased space at the SS&TP is for unclassified office, conferencing and training space — "light" labs are acceptable, but chemical labs are highly discouraged
- The SS&TP Strategic Planning Framework supports organization/center clustering based on common interest science and technology or pursuit of like-minded goals
- The SS&TP Strategic Planning Framework supports organization/center relocations that advance the SS&TP's goal of economic service for New Mexico and Albuquerque

Long-Term Strategy Related to SS&TP and the SNL New Mexico Site

Near- and Mid-Term: Continue to Lease Space at the SS&TP

- The SS&TP should continue to play a role in providing program relief, swing and outreach/external engagement space for Sandia
- New requests from Sandia organizations seeking a location in the SS&TP will be vetted against "Principles Guiding Evaluation of Groups Seeking or Being Under Consideration for Relocation to the SS&TP"

Mid-Term: Lease Space at the Center for Collaboration and Commercialization (C-3) If/When It Becomes a Viable Project

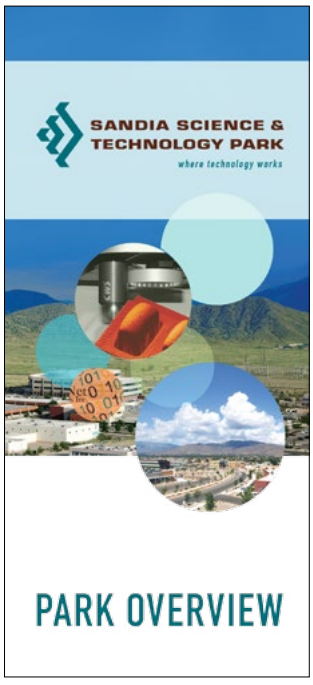
- The SS&TP Strategic Planning Framework encourages participation in the C-3 Project to specifically support technology transfer and business collaboration in response to the LRDF's call for a long-term redesign of the SNL/NM campus to support external collaboration and outreach/ engagement
- C-3 could serve as Sandia's's public face until Sandia creates its own on-site front door, corporate identity

Long-Term: Work toward Redevelopment of the NE Quadrant of TA-I to Position Sandia for Future Business Success

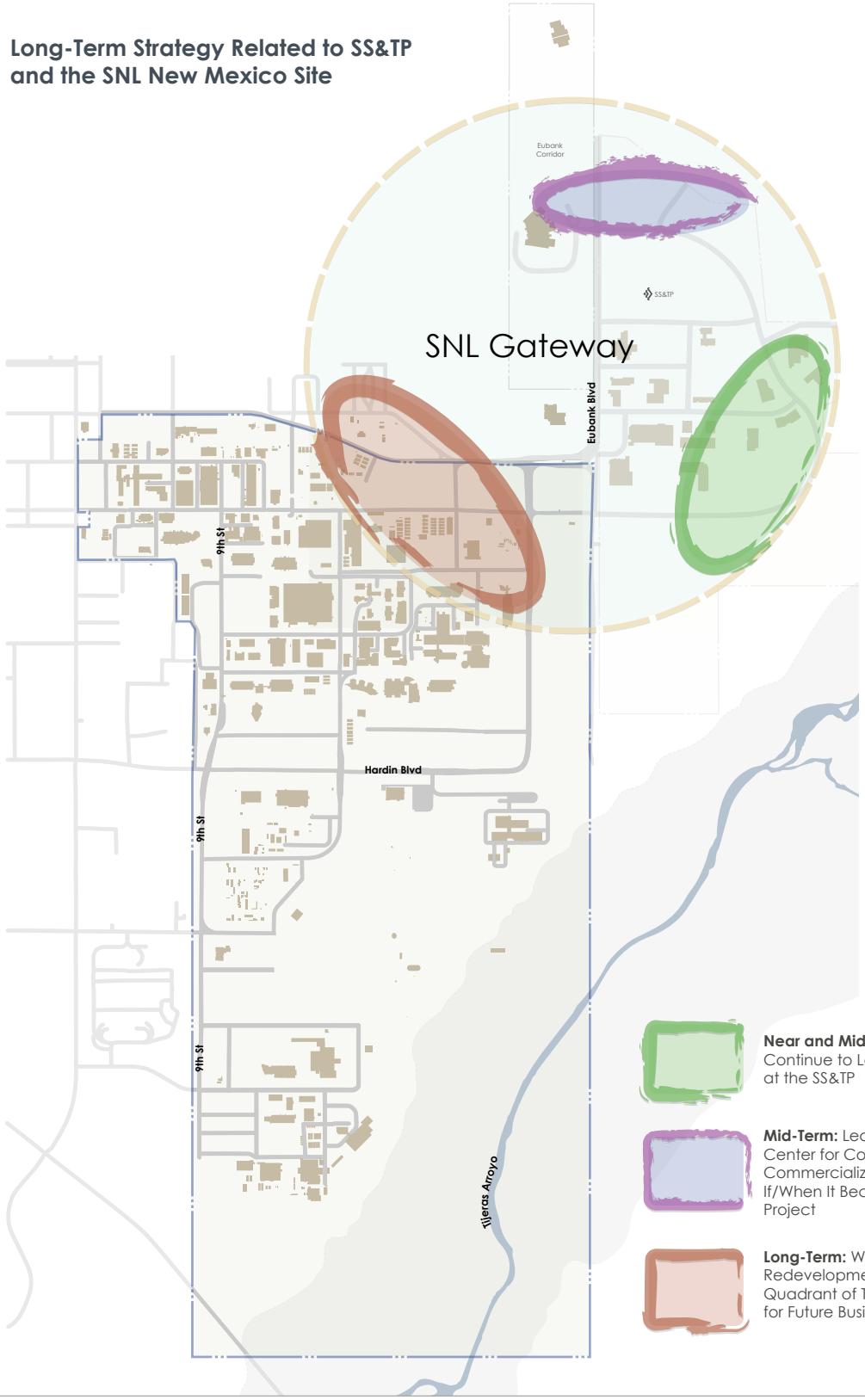
- The LRDF envisions redevelopment of the northeast quadrant of TA-I as a new front door to Sandia and a central gathering place for employees and visitors that provides support services, opportunities for formal and casual interactions, the administrative center of Sandia, and a location for the DOE/NNSA site office. The concept works in tandem with the creation of a General Access Area on DOE land to create a new development area for Sandia employees as well as its partners, customers and visitors, opening up the site for external collaboration.

More Information...

For current information on ownership, tenants, and leasing opportunities see the Sandia Science and Technology Park Overview at www.sstp.org.



Long-Term Strategy Related to SS&TP and the SNL New Mexico Site



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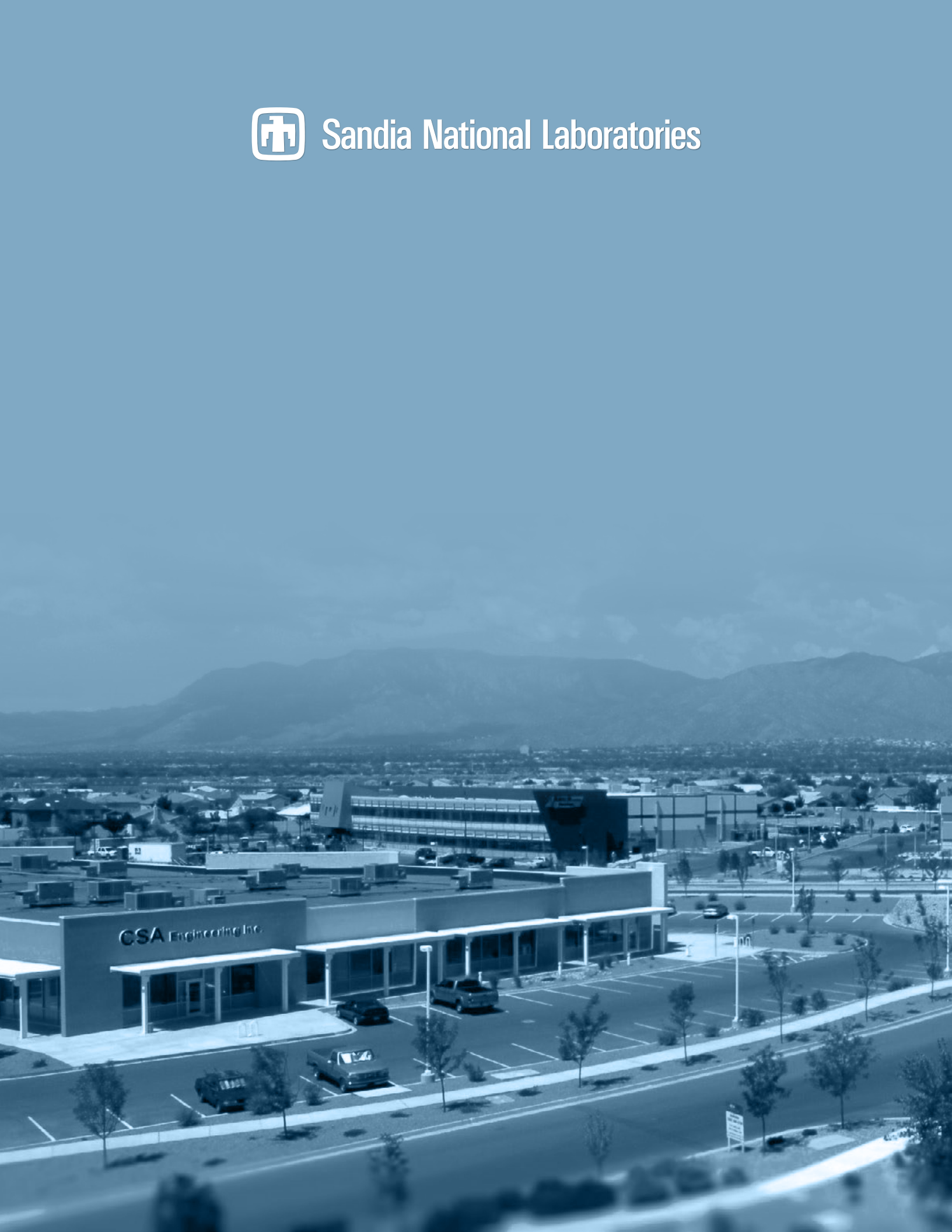
Sandia National Laboratories



Sandia National Laboratories

FACILITIES & INFRASTRUCTURE INVESTMENT PLAN

FY 2017-2021

A BLUEPRINT FOR MISSION-READY FACILITIES, INFRASTRUCTURE, AND CAPABILITIES

Sandia – Albuquerque, New Mexico

Sandia – Livermore, California

Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Table of Contents

I. Purpose

The purpose of this document is to communicate the near-term investments and longer-term strategies required to enable Sandia National Laboratories (SNL) to develop a safe, efficient, cost-effective, and operationally flexible infrastructure capable of supporting evolving missions.

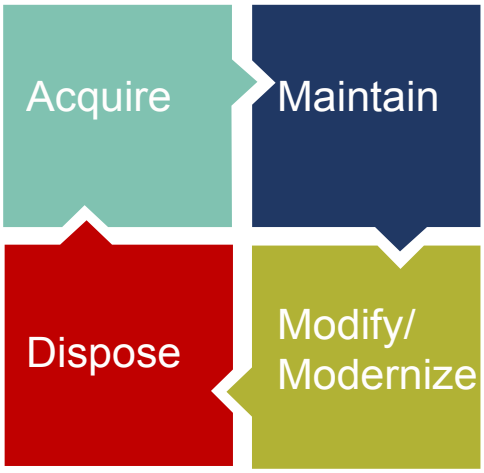
II. Strategic Investment Framework

In order to sustain an affordable, healthy facilities and infrastructure (F&I) portfolio, Sandia utilizes a four-part framework to strategically apply its funding: **Acquire, Maintain, Modify/Modernize**, and **Dispose**. Using this structure enables management to make portfolio-based decisions with consideration for minimizing the total life-cycle costs of the F&I inventory. It also supports the corporate objective to advance the work environment and meets contractor requirements of real property asset (RPA) management, such as identifying financial investment for sustainment of Department of Energy (DOE) assets, as defined in DOE Order 430.1C, Real Property Asset Management. Real property assets are defined as a "distinct parcel, building, real property trailer, other structure or facility (OSF), or interest acquired by or operated for the benefit of the DOE."

This section lays out this four-part framework by

- Defining "Acquire," "Maintain," "Modify/Modernize," and "Dispose,"
- Describing a specific strategy for each area, and
- Providing a few recently completed examples

The MESA project was the most recent line item that added square footage for capabilities and TCR was the latest line item that upgraded facilities in the remote areas.

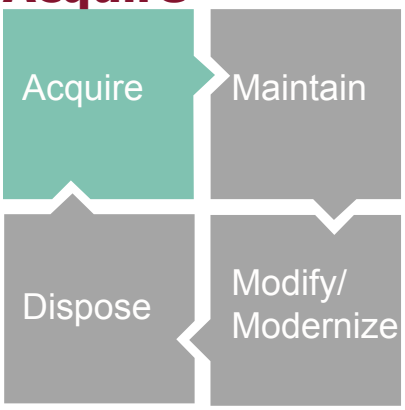


The majority of F&I funding is allocated to maintenance.

Due to high utilization rates of F&I, Sandia has few decontamination and demolition (D&D) projects in the works. D&D has been focused on site clean-up.

This year brings an emphasis on deferred maintenance and renovations.

Acquire



Definition: To add or replace RPAs through purchase or construction from various funding sources, or real estate transactions, including lease, permit, or alternative financing.

Strategy: The strategy for acquiring F&I at Sandia includes major and minor construction and leasing activities to replace existing F&I in order to replace obsolete facilities, recapitalize and modernize its sites, as well as accommodate new programs and growth.

Major Construction: Congressionally approved Line Items. A distinct design, construction, betterment, and/or fabrication of real property greater than $10M for which Congress will be requested to authorize and appropriate specific funds.

During the 2016 planning cycle, the Laboratory Leadership Team (LLT) reviewed the list of major construction proposals brought forward by each Division and prioritized the list, as shown in the table below. As a result, Sandia has unified direction on the major line item gaps in the F&I that, if not addressed, will have a negative impact on mission success.

Table 1. Line Item Priorities by LLT

LLT RANKING	LINE ITEM TITLE
1	Trusted Microsystems Capability (TMC)
2	Component Engineering Facility (replaces 892 & 894)
3	Mission Support Science & Technology Laboratory (MSSTL)
4	Research Reactor Facility (RRF)
5	Z-Next, contingent on national pulsed-power initiative
6	Tonopah Test Range (TTR) Infrastructure
ALREADY IN PROGRESS	
	Emergency Operations & Response Center
	TA-IV S Chilled Water Loop

NOTE: Many of the direct funded needs described for fiscal year 2018 (FY18) and beyond are above current funding levels. Sandia continues to defend the benefit of these out-year projects

Minor Construction: Real Property projects that have a projected total project cost of greater than $500K, and less than $10M, commonly called General Plant Projects. Minor construction can be accomplished through both direct and indirect funding in accordance with accounting standards.

Direct-funded construction is sponsored by the headquarters program driving the need and the funding goes directly toward the project. This has historically been provided through the Defense Programs

organization within National Nuclear Security Administration (NNSA) or other DOE Programs; however, sponsors within Strategic Partnership Projects (SPP) continue to express interest in expanding ways to fund capital construction at Sandia.

Examples of direct-funded investments include:

- The CAGE facility, which was constructed at the SNL/NM site within the remote testing area and supports work done for an SPP partner.
- The addition to Building 905, at SNL/NM, which was funded through NNSA's recapitalization program and provided additional office space within the facility to accommodate personnel growth supporting a nuclear weapons (NW) program.

Indirect-funded construction is sponsored through Sandia's Integrated Mission Support (IMS) organization. Since this funding is collected through a tax on all Sandia programs, it must be used for construction supporting the entire Laboratory and is general in nature.

Examples of indirect-funded investments include:

- Extension of fiber communications to the remote test areas at SNL/NM, which converted microwave communications to fiber optic based communication and improves the safety of explosives operations through better communications.
- Building 756 was recently constructed at SNL/NM, to replace old trailer buildings that have a long history of inefficient operations and expensive maintenance.
- Building C926 is nearing construction completion at SNL/CA, which will enable the relocation of mission support functions to outside the security boundary.

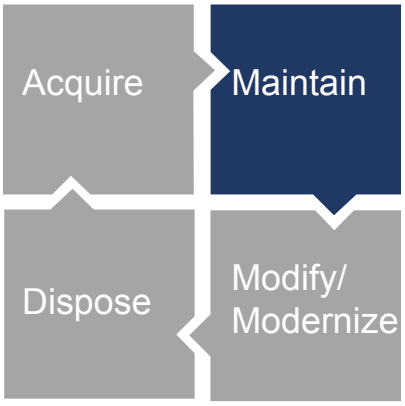
Leasing: A lease is an agreement conveying the right to use an asset for a specific period of time in return for rent or other compensation. Leases are excellent vehicles to increase the agility of the real estate portfolio where there is uncertainty or a need for timing agility in the business. Leases can be accomplished through three mechanisms: operating, alternative finance, or through leveraging of a partnership already established.

An example of leasing includes the Innovation Parkway Office Center (IPOC) is in its eleventh year of use by SNL/NM.

An example of alternative (third-party) financing includes the proposed Collaboration in Research Engineering and Advanced Technology and Education (CREATE) facility at SNL/CA, which is a project that would transfer property from NNSA to a private developer and enable construction of an office building at the SNL/CA site. This building would house functions in support of the Livermore Valley Open Campus (LVOC) long-term initiative between Sandia and Lawrence Livermore Laboratories.

An example of leveraging includes Sandia operations within a facility already owned or leased by an industry or academic partner with which Sandia has a contract. Through this mechanism, Sandia has operations within Kirtland Air Force Base, at SNL/NM, and at the Pantex plant (NNSA owned) in Amarillo, Texas.

Maintain



Definition (a): Day-to-day work required to sustain property in a condition suitable for it to be used for its designated purposes, including preventive, predictive, and corrective maintenance.

Strategy: Sandia's strategy is to maintain assets in an acceptable condition, where management working in partnership with NNSA determines acceptability, to keep facilities in good condition.

Sandia funds maintenance activities from a space charge to all of its space users. The space charge funds are collected and managed through the Operations and Maintenance (O&M) Service Center. Sandia also receives a small amount of Maintenance funding directly through NNSA, which is used for maintenance at specialized facilities supporting NW activities.

ACTIVITY	FY16 Funding ($M)
Maintenance and Energy	$59.4
Leases	$9.1
Custodial (NM & CA)	$7.6
Operations (Base Support, Fire Prot., etc.)	$14.3
Utilities (NM & CA)	$18.7
Total	**$109.1**

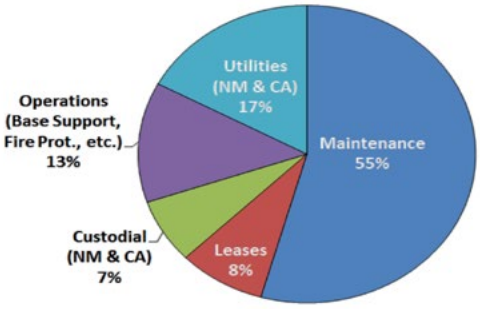
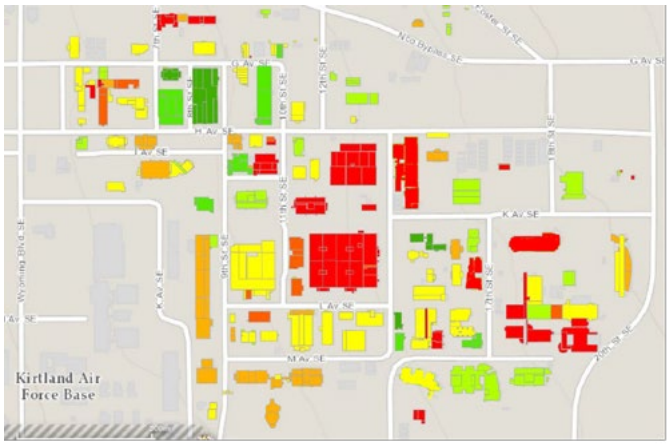


Figure 1. Operations and Maintenance Service Center

Definition (b): In addition to the day-to-day work, maintenance and repair activities include replacement of parts, systems, or components; and other activities needed to preserve or maintain the asset. Maintenance and repairs, as distinguished from capital improvements, exclude activities resulting in expanding an asset's capacity or otherwise upgrading it to serve needs different from, or significantly greater than, its current use (i.e. betterment).

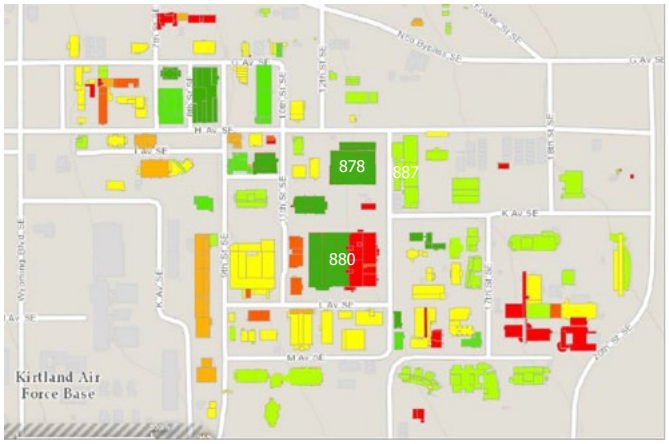
Deferred Maintenance Strategy: Due to continued aging of F&I, the surge in mission-related demands on F&I, and the historically high lab occupancy levels, deferred maintenance (DM) has been increasing at Sandia. DM and repairs are defined as "maintenance [activities] ... that [were] not performed when they should have been or were scheduled to be and which are put off or delayed for a future period." As part of an increased focus on F&I, Sandia will reduce its DM across its sites through facilities replacements, and dedicated funding to reduce the backlog of maintenance and repair needs. Sandia has reprogrammed $37M in FY17 and $40M in FY18 for projects that specifically reduce DM. This DM Special Emphasis Program will make a substantial impact on halting the growth of DM in the near-term and will also reduce risk to mission. Additional sources of enduring maintenance funding are also being pursued.

A prime example of implementing the DM strategy is the Sandia Roofing Program. According to the November 2015 Technical Assurance site-wide assessment, 35% of SNL/NM roofs and 31% of SNL/CA roofs are in "Bad, Very Bad, or Failed" condition. The Roofing Program leverages funding to fund roof-specific projects in order to improve overall performance and reduce on-call maintenance thereby enabling Sandia to be more proactive versus reactive with respect to maintenance activities on roofs. The maps below illustrate the anticipated transformation of the condition of the roofs in TA-I at SNL/NM for FY2017-2018.



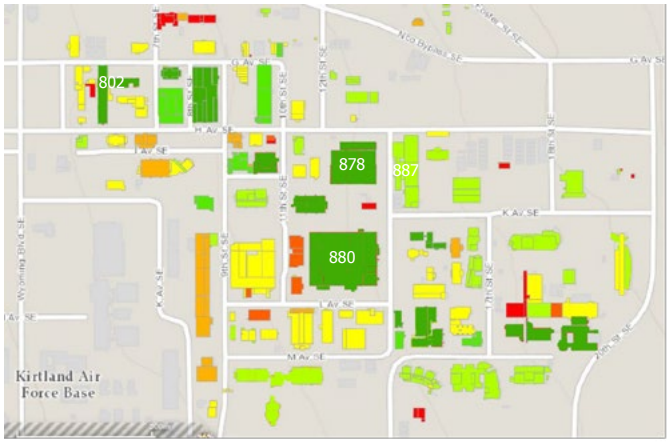
FY16

Current condition of roofs in TA-I at SNL/NM in FY16. Note all the buildings in "Failed" condition.



FY17

Condition of roofs in TA-I at SNL/NM in FY17. The condition of large buildings like 878, 880, and 887 changes from "Failed" to "Excellent."

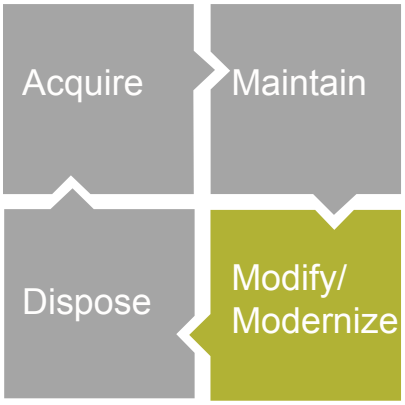


FY18

Condition of roofs in TA-I at SNL/NM in FY18. Buildings 802 and 880 are completely green while the improvement in roof condition spreads to other major buildings in the southeast quadrant of TA-I.

CONDITION
Excellent
Good
Fair
Poor
Bad
Very Bad
Failed

Modify/Modernize



Definition: The restoration or replacement of a deteriorated item, alteration to the interior arrangements and/or physical characteristics, improvements that result in better quality, increased capacity, or extended useful life of an asset (facility and/or equipment).

Strategy: Sandia's strategy to modify and modernize viable assets across the sites includes investing in projects that increase utilization through renovations, improve the overall working conditions and quality of space, restore utility systems (i.e. water, gas, stormwater, etc.) and building systems (i.e. conveyance, HVAC, Plumbing, etc.) to near original intended condition, and to renovate buildings to change use or increase capacity.

Recent examples of modification include the various space reconfigurations around Sandia to reuse conference rooms or other means to increase the number of office spaces needed to support the mission-driven growth in the Lab's personnel. The reuse of building 840 demonstrates modernization, which was converted from a machine shop function to office/light lab functions. Subsequently, further programmatic modernization projects were completed within the building by both NW and SPP sponsors.

Sandia's strategy for modification/modernization also aligns with the NNSA Supplemental Directive to DOE Order 430.1C, which states real property is planned to have a 40- to 60-year lifecycle, with recurring 15- to 20-year periods of renovation and renewal to manage with a life-cycle perspective.

To support the Modification and Modernization needs, an estimated $170M per year more than current expenditures in direct investments is required. Sandia is pursuing additional direct funds from multiple sources to support these needs.

Before

After

The renovation of Building C912 represents an approach that meets customer needs and security requirements while creating more efficient environments for building users and reducing operating costs by using furniture and partitions versus constructed walls.

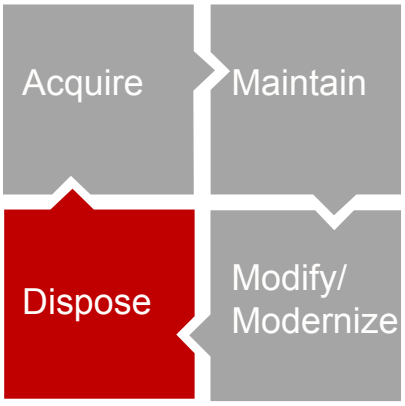
Multiple modernization projects needed include renovation of a series of three- and four-story office/lab buildings (810, 821, 823, 890, 891, 897, 962, and C910) that were built in the late 1980s and early 1990s. These buildings are referred to as "clone" buildings because the design was reused but improved with each successive building. The Clone Buildings provide approximately 1,000,000 combined square feet of building area and represent one of the most significant facility assets at Sandia. They are all in need of recapitalization.

There are also several other older, large buildings needing renovation (802, 836, 880 D-aisle, C912, etc.). Building C912 is the largest structure at the California site. The current condition of these buildings and the clones does not provide the work environment conducive to attracting and retaining America's top talent; and the longer these projects are delayed, the greater the cost in future years to bring the building conditions to levels that will advance and support Sandia's goals.

Sandia recognizes the importance of these assets and has identified renovation of these large facilities as a critical component of continued long-range mission success. Although costly and logistically complex, renovating and redeveloping the clones and California's site C912 will ensure uninterrupted mission work. The F&I Investment Plan recommends development of a proposal(s) for multi-year, institutionally-funded renovation programs to revitalize aging facilities such as the clones and C912. Further work focusing on interim space for those affected by renovation of specific structures will be required in the near future to make these renovations a success.

Clone Buildings at SNL/NM.

Dispose



Definition: To reduce or eliminate a real property asset through demolition, transfer, or real estate transaction.

Strategy: In order to continue to comply with the NNSA development footprint requirements, Sandia will continuously identify space that can be permanently removed to achieve one or more of the following:

1. Offset the acquisition of new space
2. Reduce DM
3. Achieve the overall site development vision described in the Long-Range Development Framework (LRDF)

This means targeting buildings with high DM costs and office/storage uses for disposition while considering acquiring turn-around/temporary space as a prerequisite so occupants of buildings targeted for disposition still have a space to work.

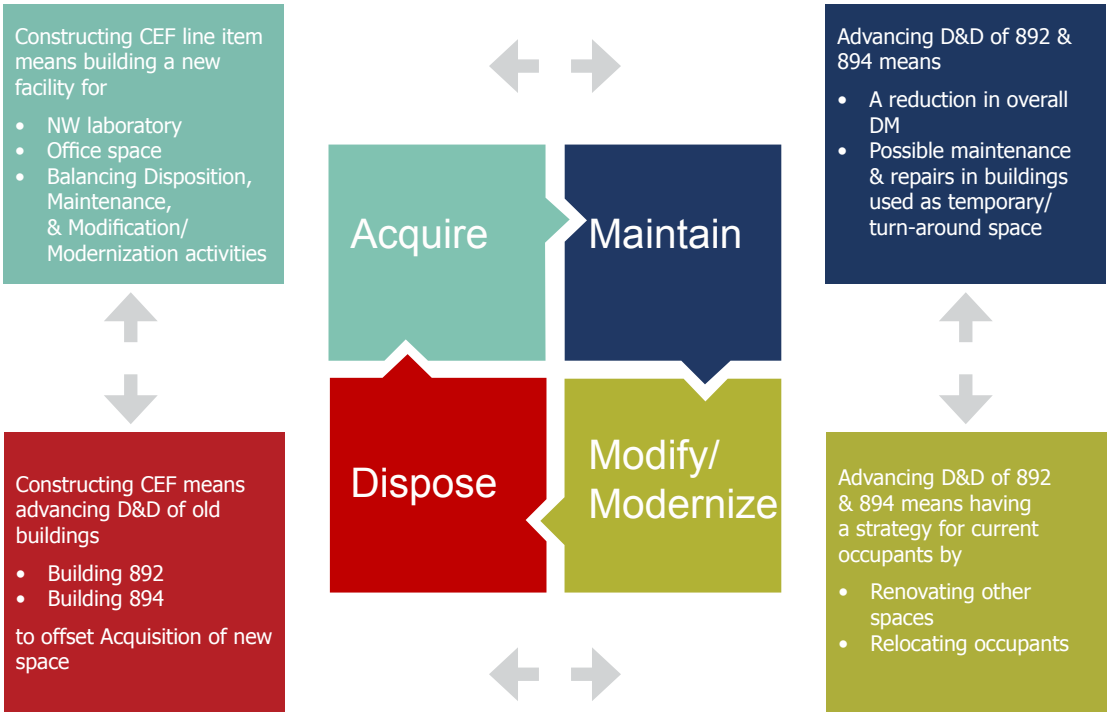
In recent years, many demolition projects have been selected to meet the requirements of this offset, particularly buildings 892 and 894 at SNL/NM. These two buildings remain major targeted buildings for removal, but they also must be replaced with new modern facilities. Sandia must successfully obtain major funding investment(s) in order to facilitate this vision.

SNL/NM Building 892

SN/NM Building 894

III. Balancing the Portfolio

In its stewardship of the real estate portfolio essential to Sandia, a balance must be maintained between all four elements of the strategic framework in order to achieve a successful outcome. The Component Engineering Facility (CEF) line item is a clear example of how this strategic framework is balanced. Construction of a new facility for the NW laboratory and office functions described in the CEF line item mission need statement would advance the disposition of buildings 892 and 894. The benefits of demolishing 892 and 894 are significant to the NW mission as well as reducing the overall DM. However, other organizations also have work in those buildings; therefore a renovation and relocation strategy is also necessary to enable vacating 892 and 894. Sandia's buildings have a current utilization rate of 98%, which is not conducive to a renovation strategy without an acquisition plan. All four elements of the strategic framework are at play in this scenario.



IV. F&I Investment Plan, FY 2017-2021

With an average building age of 38 years, Sandia's F&I continues to age and its needs continue to grow. This makes funding plans for new F&I and DM reduction necessary. Investments in line item and non-line item construction are also critically important. Thus, Sandia has to make strategic investment decisions to advance its overall mission and amplify its national security impact.

Center for Integrated Nanotechnology

The majority of near-term F&I investments are related to DM reduction, sustainment, and renovation projects, in addition to computing and infrastructure improvements. Meanwhile, major capital projects to acquire new space associated with line item funding are included in the long-term planning outlook. Acquisition of new space within the five-year planning horizon is primarily in response to the need for space for newly-hired staff. That space will be designed, configured, and operated in a manner adhering to security requirements, while simultaneously providing opportunities to perform meaningful work for the new workforce.

While the current five-year F&I investment scenario focuses on reducing DM to minimize risk to mission, other investments that have been identified during the next five years include work in the areas of **Modify** and **Acquire**. Additional funding for the **Dispose** category of expenditures will also support compliance with NNSA development footprint requirements.

Principles for the Five-Year Investment Plan

Sandia has two types of investments: direct investments and indirect investments. Direct funded investments are mission-based, established to reduce risk to the mission and advance corporate objectives. Indirect funded investments are founded on a principles-based approach toward F&I investing consistent with other strategic planning activities at Sandia. The following investment principles help Sandia improve decision-making in the areas of facilities and infrastructure during the next five years:

1. Embrace an Enduring Recapitalization Program

- Address major building and institutional infrastructure modernization/sustainment/D&D
- Address capability enhancements (explosives consolidation, secure space SNL/CA, high bay space within Tech Area I (TA-I), seismic upgrades, records storage, etc.)
- Ensure the program is strategically aligned with Mission Areas, Program Management Units (PMUs), and Divisions
- Identify sustainable funding from multiple sources, including line items

2. Optimize Utilization of Existing Space

- Accommodate near-term growth with existing office space capacity

- Recognize and treat space as a lab-wide asset
- Partner with capability owners to identify lab and storage space opportunities
- Improve facilities operational efficiency

3. Effectively Manage Laboratory Footprint

- Vacate and prep substandard space for removal from inventory
- Consider full life-cycle cost when adding footprint (Initial investment + Operations and Maintenance)
- Conduct long-range planning

These investment principles serve many different important purposes. They are the basis for scoring potential projects in the near- and mid-term for Sandia's Facilities Management & Operations Center's (FMOC's) Capital Investment Program (CIP), in addition to this F&I Investment Plan. Actively utilizing these principles promotes a principle-based approach to F&I investment decisions that is consistent with other strategic planning activities at Sandia. They also lean toward investing in recapitalization, DM reduction, and maintenance improvements versus acquisition and/or D&D.

The following table provides an at-a-glance look at the annual investments Sandia is making by funding source for FY17-21.

Table 2. Annual Investments by Funding Source (Data Current as of 09/23/16)

FUNDING SOURCE	FY16 ($M)	FY17 ($M)	FY18 ($M)	FY19 ($M)	FY20 ($M)	FY21 ($M)
DIRECT						
Line Item	-	-	-	40 (EORC)	-	-
Recapitalization	15.8	19.9	17.5	21.1	20.8	20.8
Recapitalization Working Target (FY18 Only)			16.3			
Disposition	1.2		1.0	0.3		
Capabilities Based Investments (CBI)	23.5	24.3	24.1	25.9	13.8	15.0
Maintenance (NA-50)	2.0	2.0	4.0	4.0	4.0	4.0
INDIRECT						
Integrated Mission Support (IMS) Investment	15.9	5.3	6.7	15.0	15.7	15.0
Deferred Maintenance Special Emphasis Program		40	30			
Maintenance (Projected)	45	55	55.7	46.7	47.6	48.6
Projects (Restoration/DM, Utility Savings, Renovation)	31	14	15	25	25	25
CUSTOMER FUNDED (AVG-Division Support, PIR, etc.)	55	52	50	48	48	48

2017-2021 F&I Investments Performance Results

In tying the annual investments outlined in Table 2 (on previous page) for FY17-21 back to the framework, the following results are expected:

Acquire

Nominal acquisition of new space, balanced with disposition:

- Compliance with "Reduce the Footprint;" Leasing with an 'exit strategy'
- Focused prioritization of major construction, including demolition, for FY19 and beyond

Maintain

Maintenance and repair activities at current funding levels:

- Stabilization of and some reduction in DM for FY17-18 with DM Special Emphasis Program
- Continuation of declining condition levels through 2021

Modify

Basic recapitalization of infrastructure & viable building assets:

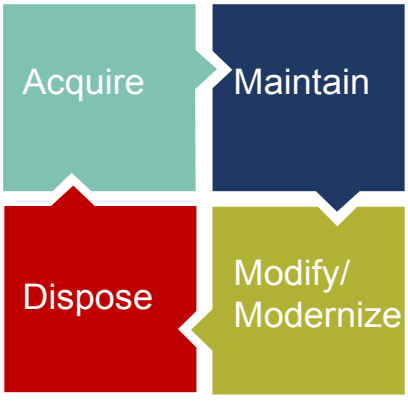
- Increased space utilization
- Use of Integrated Mission Support (IMS) funding for DM and general-purpose projects
- Continued exploration of NNSA & other funding for recapitalization
- Inital phases of B823 renovation

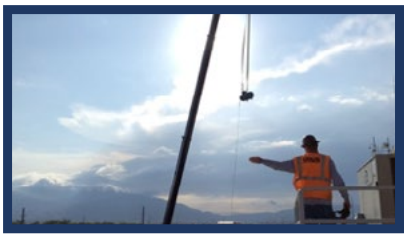
Dispose

Limited disposition of excess assets:

- Current focus: TTR, Kauai Test Faciity (KTF), sheds, and mobile offices
- Limited activity beyond FY18 due to continued high levels of space utilization

In short, additional funding support along with indirect funding and General Plant Project (GPP) investments are required to support Sandia's growing needs and aging infrastructure. Line item investments must play a major role in supporting the Capabilities.





V. Moving Forward

Sandia enables mission success through effective stewardship of its F&I using a risk-based approach and a combination of direct and indirect funding. As funding pressures increase within the complex, and Sandia continues to see programmatic growth, funding challenges are also increasing. These challenges, in addition to others, are summarized below.

Funding-Related Challenges

- As a multi-program laboratory, Sandia would benefit from multi-program sponsored F&I processes and funding
- Funding for infrastructure across the complex is not keeping up with age
- A total cost of F&I needs identified in Division F&I Plans is greater than available funding which requires a robust prioritization
- Budgeting uncertainty results in planning challenges

Other Challenges

- F&I Plan growth assumptions sometimes conflict with projections resulting in sub-optimal planning for space
- Constraints on indirect funding limit the sites ability to supplement NNSA in site recapitalization
- Increased need for agility and flexibility in funding/spending, challenged by processes and requirements
- Need for long-term funding source to buy down DM
- Funding is a constraint in itself, but regulations and policies further complicate site's abilities to implement strategies.

Sandia's commitment to infrastructure renewal reduces F&I risk to mission and implements the development visions for the sites. Aside from the Emergency Operations & Response Center (EORC), Sandia currently has nine proposed line item capital investments, at varying degrees of conceptualization, being considered by NNSA for future funding based upon business cases that articulate risk to mission and modernization needs. In viewing NNSA's overall infrastructure challenges associated with modernizing the nuclear security enterprise, and keeping in mind NNSA's near-term infrastructure priorities, many of Sandia's proposed line items have uncertain futures and long-term funding timelines. Adapting its approach could help Sandia minimize mission risk and support modernization needs associated with capabilities reliant on the line item process to secure long-term required facilities and infrastructure support. As the line item funding source plays such a critical role in recapitalizing the NNSA sites, any discussion of improving the ability to recapitalize F&I must consider the challenges and opportunities associated with the line item process.

Recommended Actions & Policies

Sandia enables mission success through effective stewardship using a risk-based approach and a combination of direct- and indirect-funding. Sandia has evolved from a NW Laboratory to a multi-mission, national security Laboratory that has brought great results back to the NW mission. As funding pressures increase within the complex, and Sandia continues to see programmatic growth, funding challenges are also increasing.

Going forward, Facilities will continue to work with Mission Area and PMU leadership to prioritize activities that most effectively mitigate risk to mission due to condition of critical facilities and infrastructure.

Current Status	The first set of Division F&I Plans were completed toward the latter part of 2015.
Remaining Work	Develop the next iteration of Division F&I Plans to be even more robust and contain more information to support consistent prioritization of investment needs.

Continue to seek external funding (Line item, NA-50, other) to make fundamental improvements and develop policies/procedures to support achievement of business model options that enable and entice interagency work infrastructure investment at Sandia.

Current Status	NNSA Headquarters, particularly NA-50 and NA-10, recognizes the need to reinvest in F&I and the deficiencies in current funding for F&I. There has been an attempt to enable the exploration and utilization of non-NNSA funding for F&I at the sites.
Remaining Work	Continue to examine and advance direct and third-party financing alternatives.

Develop Line Item proposals for general infrastructure based on life-cycle asset management.

Current Status	Comprehensive infrastructure plans have been prepared to specifically address the needs of infrastructure assets at both SNL/NM and SNL/CA sites i.e. MESA sustainment.
Remaining Work	Continue to include condition-related data in the identification and prioritization of potential infrastructure line item investments.

Mandate lower office space per capita allocations based on industry best practices, and the federal standard of 180 USF/person when undertaking renovations and new construction.

Current Status	FMOC is drafting a Space Management Strategic Plan to address this issue.
Remaining Work	Revise space policies and standards. Fully implement Space Utilization Initiative.

Continue to engage Sandia Security in addressing design requirements for secure environments to support shifting the culture away from the single office mentality for classified work.

Current Status	Recent construction projects reflect a cooperative design effort that has engaged the customers, FMOC, and Sandia Security in the design and construction of work environments that meet customer needs, provide required security, and reflect new ideas.
Remaining Work	Continue to engage Security in the revision of space policies and standards and in the design and construction of new or renovated space to reduce cost to projects and operating costs.

VI. APPENDICES

Appendix 1 – Projects Grouped within the Framework

Legend:		
Indirect		Direct (NNSA)
Investment		SPP. FIE
Operating	PL/OT	Planned/Over Target
Division Support, Customer-funded (CF)		

Budget Planning			PL/ OT			PL/ OT			PL/ OT			PL/ OT			PL/OT
Acquire	**FY17 ($M)**	**Projects**		**FY18 ($M)**	**Projects**		**FY19 ($M)**	**Projects**		**FY20 ($M)**	**Projects**		**FY21 ($M)**	**Projects**	
Indirect															
Investment-Minor Construct ion													4.00	Replace B818 and B819 (5.7 in FY22)	PL
				0.50	TA-I High Bay Space	PL	4.00	TA-I High Bay Space	PL				9.70	*Consolidated Waste Mgmt. Fac.*	OT
				4.50	*Corporate Space Optimization*	OT	4.50	Corporate Space Optimization	PL	4.50	*Corporate Space Optimization*	OT			
Lease					SSC			CREATE			CREATE			CREATE	
Division Support, CF															
SPP, FIE															
				0.75	895 Staging/ Storage Add		6.75	895 Staging/Storage Add							
Direct															
Minor Construction		B905 Addition/ Renovation Complete	PL	8.00	Battery Test Facility	PL	*9.50*	*TA-IV Z Support Bldg. & Remove trailer's*	OT	*9.50*	*TTR Mission Support Facility*	*OT*			
				7.50	*905 Explosive Mfg. Addition*	*OT*	*9.50*	*Explosives Machining Facility*	OT						
				5.00	*TBF New Explosive Assembly*	*OT*									
Major Construction							**40.00**	**Emergency Operations Center (EOC) Construction**	PL						
Funding total	**-**			**26.25**			**74.25**			**14.00**			**13.70**		

Maintain	FY17 ($M)			FY18 ($M)			FY19 ($M)			FY20 ($M)			FY21 ($M)		
Indirect	45.00			45.70			46.70			47.60			48.60		
Investment	3.70	Builder	PL	0.68	Builder	PL									
Operating	10.00	Slow down DM Growth		10.00	Slow down DM Growth										
Direct (NA-50)	2.00			4.00			4.00			4.00			4.00		
SPP. FIE															
Funding total	**60.70**			**60.38**			**50.70**			**51.60**			**52.60**		

Modify	FY17 ($M)	Projects		FY18 ($M)	Projects		FY19 ($M)	Projects		FY20 ($M)	Projects		FY21 ($M)	Projects	
Indirect															
Investment	5.20	*C912 Renovation**	OT	4.30	*C912 Renovation**	OT									
* Included in proposed list of projects for DM Special Emphasis Program	0.50	*B880 D Aisle Renovation**	OT	4.50	*B880 D Aisle Renovation**	OT				5.00	*C904 Renovation*	OT			
	3.90	*TA-IV South Escarpment*	OT	0.50	B823 Renovation	PL	4.00	B823 Renovation	PL	5.20	B823 Renovation	PL			
	3.12	*Moves and Modification for Space Optimization*	OT	1.00	Moves and Modification for Space Optimization	PL	1.00	Moves and Modification for Space Optimization	PL	1.00	Moves and Modification for Space Optimization	PL	1.00	Moves and Modification for Space Optimization	PL
	0.45	*B880 annex MCC12 and MCC13 -Refurb**	OT	3.00	Explosives Activity Consolidation	PL									
	1.00	*C912 Data Center Repair**	OT												
	1.55	Extend Fiber Communications to Additional Remote Areas	PL	1.20	*C911 Office Renovation**	OT									
				0.50	*725 Addition*	OT	6.00	*725 Addition*	OT	3.00	*725 Addition*	OT			
DM Special Emphasis Program	36.35		PL	30.00		PL									
		IMS Investments			IMS Investments										
		Roofs			Roofs										
		HVAC			HVAC										
		Electrical			Electrical										
		Fire Protection/Alarms			Fire Protection/ Alarms										
		Interior			Interior										
		DM/Restoration			DM/Restoration										
DM Special Emphasis Program				10.00	*Potential Additional Funding*	OT									

Modify	FY17 ($M)	Projects		FY18 ($M)	Projects		FY19 ($M)	Projects		FY20 ($M)	Projects		FY21 ($M)	Projects	
Renovation															
	0.06	Electrical		5.00	To Be Determined (TBD)		5.00	TBD		5.00	TBD		5.00	TBD	
	0.75	Infrastructure													
	1.38	Interior													
	2.51	Mech-HVAC													
	0.15	New Bldg.													
Restoration															
	0.50	Conveyance		5.00	TBD		15.50	TBD		15.50	TBD		15.50	TBD	
	0.45	Electrical		3.00	Conveyance		3.00	Conveyance		3.00	Conveyance		3.00	Conveyance	
	1.44	Mech-HVAC													
	1.00	Ops Support													
	3.00	FY18 Designs													
	2.00	DM Reduction Centric Projects not selected													
Utility Savings															
	1.50	Compliance		1.50	Compliance		1.50	Compliance		1.50	Compliance		1.50		
Division Support, CF															
	5.00	Div. 1000 DS Space Modes		5.00	Div. 1000 DS Space Modes		5.00	Div. 1000 DS Space Modes		5.00	Div. 1000 DS Space Modes		5.00	Div. 1000 DS Space Modes	
	5.00	Div. 2000 DS Space Modes		5.00	Div. 2000 DS Space Modes		5.00	Div. 2000 DS Space Modes		5.00	Div. 2000 DS Space Modes		5.00	Div. 2000 DS Space Modes	
	5.00	Div. 5000 DS Space Modes		?	Div. 5000 DS Space Modes		?	Div. 5000 DS Space Modes		?	Div. 5000 DS Space Modes		?	Div. 5000 DS Space Modes	
				2.10	Modify 880/Y40		4.70	899 Mods for Data Center		5.00	899 Mods for Data Center				
	0.40	Misc. 880A Improvements		0.40	Misc. 880A Improvements		0.40	Misc. 880A Improvements		0.40	Misc. 880A Improvements		0.40	Misc. 880A Improvements	
	2.00	Data Center Consolidation		2.00	Data Center Consolidation		2.00	Data Center Consolidation		2.00	Data Center Consolidation		2.00	Data Center Consolidation	
SPP, FIE															
	4.30	840 Engineered Product Lab		2.50	840 Engineered Product Lab		5.00	840 Engineered Product Lab		6.00	840 Engineered Product Lab		2.05	840 Engineered Product Lab	

Disposition	FY17 ($M)	Projects		FY18 ($M)	Projects		FY19 ($M)	Projects		FY20 ($M)	Projects		FY21 ($M)	Projects	
Indirect															
Investment				1.00	TBD	PL	1.50	TBD	PL	9.50	Decontaminate B892**	PL	10.00	Demolish B892**	PL
DM Special Emphasis Program	3.65	TA-1 T's, TTR Cleanup, Advanced Actions, CA-Mos, KTF, CTF	PL												
													??	*Demolish B818 and B819*	OT
NA-50		TTR Area 03 and Area 09	PL	1.00	Mt. Haleakala	PL	*1.40*	*B853 and Accessory Bldg., B849 and Accessory Bldgs. TA-III Accessory Bldg.*	*OT*			*OT*	*3.50*	*B867 Demolition*	*OT*
										38.80	**Disposition B6580 & B6581**	*OT*			
Funding total	**3.65**			**2.00**			**2.90**			**48.30**			**13.50**		

Appendix 2 – Annual Investment by Funding Source (as of 09/23/16)

FUNDING SOURCE	FY16 ($M)	FY17 ($M)	FY18 ($M)	FY19 ($M)	FY20 ($M)	FY21 ($M)
Direct						
Line Item	-	-	-	40.0	-	-
Detailed backup				EOC, $40M		
Recapitalization	15.8	19.9	17.5	21.1	20.8	20.8
Detailed backup	Sandia Planning, $1.5M	Sandia Planning, $0.3M	Sandia Planning, $0.75M	Sandia Planning, $0.75M	Sandia Planning, $0.75M	Sandia Planning, $0.75M
	B894 Power Supplies Sustainment, $3.7M	B862 (Standby Power Plant) Upgrades, $5.5M	CTF, Twin Tanks Piping Replacement, $.2M	Estimated $20M pending selection--CA Potable/Fire Water Sys-$9.7M, 12.47kV Overhead Line Repl-$2.0M, TA-II and IV Natural Gas Piping Replacement-$7.5M	Estimated $20M pending selection--TAI Thermal Storage for Cooling Loop-$1.86M, C940 Seismic Upgrades, $2.6M, C912 Seismic Upgrade-$3.5M, 5kV Overhead Feeder Replacement (6923 and 9956)-$.87M, C912, 2nd Flr South Wing, Major Building Renovation-$5.0M, RMMF Redundant Waterline Upgrade-$0.7M, Pavement Upgrades-20th/H Ave-$1.1M	Estimated $20M pending selection-C966 Seismic Upgrade-$5.8M, Telecom Backbone M Ave-$10.0M, Tech Area I Water Main Replacement (IV)-$1.09M
	B870 (NGE) Production Renovation, $6.0M	B827 (Primary Standards Lab) Renovation, $6M	NM High Voltage System, Overhead Switch- SW-390 Replacement, $.2M			
	B862 Upgrades, $3.0M	TA-1 Domestic Water and Fire Protection Lines Replacement, $2.6M	Natural Gas System, Tech Are I, Piping Replacement, $1.2M			
	B827 (PSL) Renovation, $.5M	Seven Small workplace improvement (WPI) Projects, $.5M	B960 Chilled Water System Upgrade, $3M			
	C914 Seismic Upgrade, $0.5M	B6588 (ACRR) Facility Renovation, $5M	NM Tech Area III/V, 14 " Water Main Replacement, $4.1M			
	6588 Roof Removals, $.6M		B1012 - Battery Test Facility construction, $8M			
Recapitalization Working Target (FY18 Only)			16.3			
Detailed backup			SNL/CA Sanitary Sewer Replacements, $7M			
			Bldg. C914 Seismic Upgrades, $9.3M			
Disposition	1.2		1.0	0.3		
	TTR Area 03 & 09 Disposition, $1.2M		Mt. Haleakala, $1.0M	Estimated $0.3M for Disposition		
CBI	23.5	24.3	24.1	25.9	13.8	15.0
Detailed backup	SSiFR, $23.5M	SSiFR, $24.3M	SSiFR, $24.1M	SSiFR, $23.4M	Programmatic Capital Equipment, $8.9M	Programmatic Capital Equipment, $10.0
				Programmatic Capital Equipment, $2.5M	LIHE, $4.9M	Explosive Mfg Facility, $5.0M
Maintenance (NA-50)	2.0	2.0	4.0	4.0	4.0	4.0
Indirect						
IMS Investment	15.9	5.3	6.7	15.0	15.7	15.0
Detailed backup	GENERAL PURPOSE-IGPP 705, $0.32M		B823 Renovation, $0.5M	B823 Renovation, $4.0	B823 Renovation,$5.2M	Moves and Modification for Space Optimization, $1.0M
	IGPP BUILDING 756, $6.58M	Extend Fiber Communications to Additional Remote Areas, $1.55M	Moves and Modification for Space Optimization, $1.0M	Moves and Modification for Space Optimization, $1.0M	Moves and Modification for Space Optimization, $1.0M	Replace B818 and B819 , $4.0M

FUNDING SOURCE	FY16 ($M)	FY17 ($M)	FY18 ($M)	FY19 ($M)	FY20 ($M)	FY21 ($M)
	SITE RECONFIGURATION IGPP C926, $6.24 M	CREATE Alternative Finance Proposal (AFP)/Execution, $0.17M	Explosives Activity Consolidation, $3.0M	TA-I High Bay Space, $4.0M	Decontaminate B892, $9.5M	Demolish B892, $10.0M
	Decontamination & Demolition for Footprint Reduction, $1.05M	BUILDER Phases IV, V, and VI Implementation, $3.71M	TA-I High Bay Space, $0.5M	Corporate Space Optimization, $.4.5M		
	Extend Fiber Communications to Additional Remote Areas, $1.20M		Disposition, $1.0M	Disposition, $1.5M		
	CREATE Alternative Finance Proposal (AFP) - IO-12 Non-Baseline, $0.30M		Builder, $0.68M			
	BUILDER Implementation (Reserve $),$0.29M					
DM Special Emphasis Program		40.0	30.0			
Detailed backup-Projects TBD based on approval from Kim Sawyer		IMS Investments	IMS Investments			
		Roofs	Roofs			
		HVAC	HVAC			
		Electrical	Electrical			
		D&D	D&D			
		Fire Protection/Alarms	Fire Protection/ Alarms			
		Interior	Interior			
		DM/Restoration	DM/Restoration			
Maintenance (Projected)	45.0	55.0	55.7	46.7	47.6	48.6
Preventive Maintenance at Working Facilities	From Brandon	$26.9M	$27.4M	$28.0M	$28.6M	$29.1M
Corrective Maintenance at Working Facilities		$17.9M	$18.3M	$18.7M	$19.0M	$19.4M
Add money to slow DM growth		$10M	$10M	-	-	-
Projects (Restoration/DM, US, Renovation)	31	14	15	25	25	25
Detailed backup	See CIP, DM/Restoration, $15M	Restorations, $8.4M	Restorations, $8M	Restorations, $18.5M	Restorations, $18.5M	Restorations, $18.5M
	See CIP, Renovation, $10.7M	Renovations, $4.8M	Renovations, $5M	Renovations, $5M	Renovations, $5M	Renovations, $5M
	See CIP, Utility Savings, $5.0M	Utility Savings Compliance, $1.5M	Utility Savings Compliance, $1.5M	Utility Savings Compliance, $1.5M	Utility Savings Compliance, $1.5M	Utility Savings Compliance, $1.5M
Customer Funded (Avg.-Division Support, PIR, etc.)	55.0	52.0	50.0	48.0	48.0	48.0
Totals	189.17	212.78	203.95	225.95	174.85	176.35

APPENDIX 3 - GLOSSARY

ACQUISITION	Adding square footage to the overall footprint through construction of new space or obtaining a lease.
ALTERATIONS	Adjustments to interior arrangements or other physical characteristics of an existing facility so that it may be more effectively adapted to or used for its designated purpose. Alterations do not result in betterment to a facility.
BETTERMENTS	Capitalized improvements to facilities that result in better quality work, increased capacity, and/or extended useful life as required to accommodate regulatory and other changes to requirements. Determining when and to what extent expenditure should be treated as betterment requires judgment. Betterments include construction, conversion, and major renovation & replacement.
CAPITAL PROJECT	A capital project costs >$500K and is characterized as a betterment - an improvement to the facility that results in better quality, higher capacity, greater energy efficiency, and extended useful life, or work required to accommodate regulatory or other requirement changes. (DOE Financial Management Handbook, Chapter 10 - Accounting for Property, Plant, and Equipment)
CONSTRUCTION	The erection, installation, or assembly of a new plant facility; the addition, expansion, improvement, or replacement of an existing facility; or the relocation of a facility. Construction includes equipment installed in and made part of the facility and related site preparation; excavation, filling and landscaping, or other land improvements; and design of the facility.
CONVERSION	A major structural revision of a facility that changes the functional purpose for which the facility was originally designed or used.
CORRECTIVE MAINTENANCE	The repair or restoration of failed or malfunctioning equipment, systems, or facilities to their intended functions or design conditions. Does not result in a significant extension of the expected useful life.
DEACTIVATION	Placing a facility in a stable and known condition including the removal of hazardous and radioactive materials to ensure adequate protection of workers, public health and safety, and the environment, thereby limiting the long-term cost of surveillance and maintenance.
DECOMMISSIONING	The process of closing and securing a nuclear facility or nuclear materials storage facility to provide adequate protection from radiation exposure and to isolate radioactive contamination from the human environment. It takes place after deactivation and includes surveillance, maintenance, decontamination, and/or dismantlement. The ultimate goal is unrestricted release or restricted use of the site.
DEFERRED MAINTENANCE	Maintenance that was not performed when it should have been or was scheduled to be and which is put off or delayed for a future period.
DIRECT FUNDING	Funding that comes directly into Sandia from DOE, Other Federal Agencies (OFAs), Non-Federal Entities (NFEs), Cooperative Research and Development Agreements (CRADAs), and Inter-Entity Work (IEW) Orders to perform specific work.
DISPOSITION	Those activities that follow completion of program missions, including, but not limited to, preparation for reuse, surveillance, maintenance, deactivation, decommissioning, and long-term stewardship.
EXPENSE PROJECT	Projects that are not capital projects or betterments.

FACILITY	Land, buildings, and other structures, their functional systems and equipment, and other fixed systems and equipment installed therein, including site development features outside the plant, such as landscaping, roads, walks, parking areas, outside lighting and communication systems, central utility plants, utilities supply and distribution systems, and other physical plant features.
FUNDING	Sandia's authority (usually in monetary terms) to incur costs or to involve the Government in contracts that will incur costs. Can be allocated for one year or can span several years for a project. Funding expires at the end of its designated time allocation. Once funds expire, they cannot be used for new costs or commitments. Expired funds can be used to pay for costs or commitments incurred prior to the fund's expiration date.
GENERAL PLANT	Miscellaneous minor new construction projects of a general nature, the Total Estimated
PROJECT (GPP)	Costs of which may not exceed the congressionally established limit of $10M. GPPs are necessary to adapt facilities to new or improved production techniques; to affect economies of operation; and to reduce or eliminate health, fire, and safety problems.
INDIRECT FUNDING	Indirect funding is generated from the assessment of Burdens on Direct costs. Burdens are assessed on Operating, Capital Equipment, GPP, and Construction costs in order to pay for our overhead activities. Corporate Indirect funding is primarily managed by the Integrated Mission Support (IMS) SMU.
INSTITUTIONAL	Misc minor (i.e. up to $5M) new construction of a general institutional nature benefiting
GENERAL PLANT	multiple cost objectives and required for general purpose site-wide needs. IGPPs do not
PROJECT (IGPP)	include projects whose benefit can directly be attributed to a specific or single program.
INFRASTRUCTURE	All real property, installed equipment, and related real property that is not solely supporting a single program mission at a multiprogram site or that is not programmatic real property at a single program site.
LIFE CYCLE	The life of an asset from planning through acquisition, maintenance, operation, remediation, disposition, long-term stewardship, and disposal.
LINE ITEM PROJECT	Those separately identified project activities that are submitted for funding and are specifically reviewed and approved by Congress.
MAINTENANCE	Day to day work that is required to sustain property in a condition suitable for it to be used for its designated purposes, including preventive, predictive, and corrective maintenance.
MAJOR RENOVATION	A complete reconstruction of a facility that has deteriorated or has been damaged beyond
& REPLACEMENT	the point where its individual parts can be economically repaired.
PREDICTIVE	Those activities involving continuous or periodic monitoring and diagnosis to forecast
MAINTENANCE	component degradation so that "as needed" maintenance can be scheduled.
PREVENTIVE	Those periodic and planned actions taken to maintain a piece of equipment within design
MAINTENANCE	operating conditions and extend its life and performed before equipment failure or to prevent equipment failure.
PROGRAMMATIC	Refers to reactors, accelerators, and similar devices used by programmatic personnel,
REAL PROPERTY	acquired with line item funding.

PROJECT	A unique effort having defined start and end points undertaken to create a product, facility, or system. Built on interdependent activities planned to meet a common objective, a project focuses on attaining or completing a deliverable within a predetermined cost, schedule and technical scope baseline. (DOE O 413.3b, Attachment 2) To provide consistency for project funding type assignment, the Facilities Management Operations Center (FMOC) applies criteria to each project to determine the predominant intent of the project scope and assigns funding to the project based on the appropriate funding sources as described in the above table. A single source of funding must be used for each project; either direct, or a single source of indirect.
REAL PROPERTY	Any interest in land, together with the improvements, facilities, structures, and fixtures
ASSET	located thereon, including prefabricated movable structures and appurtenances thereto, under the control of DOE. It includes both government-furnished property and contractor-acquired property. DOE-owned, -used and -controlled land, land improvements, structures, utilities, installed equipment, and components are included. Real property and real estate means land and rights in land, ground improvements, utility distribution systems, and buildings and other structures.
RECAPITALIZATION	Major renovations or reconstruction activities, including facility replacements, needed to keep existing facilities modern and relevant in an environment of changing standards and missions. This includes the restoration and modernization of existing facilities but not the acquisition of new facilities or the demolition of old ones, unless the demolition is carried out as part of a renovation project or in conjunction with construction of replacement footprint elsewhere.
REPAIR	The restoration of failed or malfunctioning equipment, system, or facility to its intended function or design condition. Repair does not result in a significant extension of the expected useful life.
REPLACEMENT	Cost to replace the existing structure with a new structure of comparable size using current
PLANT VALUE	technology, codes, standards, and materials.
SITE	A geographic area owned or leased by or for the account of the Federal Government for the performance of DOE program activities. The term includes any extant buildings, infrastructure, and other improvements.
SUSTAINMENT	Maintenance and repair activities necessary to keep the inventory of facilities in good working order. This includes regularly scheduled maintenance as well as anticipated major repairs or replacement of components that occur periodically over the expected service life of the facilities.